Ambient Air Quality Monitoring
Opportunity and Warm Springs Sites
First Quarter of 2010

Prepared for

Anaconda Deer Lodge County

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1.0 INTRODUCTION

This quarterly report documents the ambient air quality monitoring program conducted by Kuipers & Associates on behalf of Anaconda Deer Lodge County (ADLC) at Opportunity and Warm Springs locations adjacent to the Atlantic Richfield Lower Waste Management Area (LWMA). The months of January through March 2010 are included in this quarterly report, with a more detailed data summary in the monthly reports.

Objectives of this quarterly report include the following:

- Summarize the PM10 and Total Suspended Particulate (TSP) data on a quarterly basis and compare to applicable standards.
- Compare daily average TSP values recorded by the Opportunity Site against the PM10 values reported by the Atlantic Richfield Company's South Site.
- Present summarized meteorological data for the quarter.
- Present summarized results for ambient dust sampling conducted during the quarter.
- Present the Data Quality Summary (PM10, TSP and meteorological).
    - Review the hourly data according to the Environmental Protection Agency's Air Quality System Null Data Qualifier Codes.
    - Format hourly PM10 and TSP data for each month to fit the Environmental Protection Agency's Air Quality System raw data template.

Figure 1 shows the ADLC monitoring locations in Opportunity and Warm Springs, and the Atlantic Richfield Company’s South Site monitoring location.


ADLC Warm Springs PM10
ARCO North PM10
ADLC Opportunity TSP
ARCO South PM10
Feet
0 625 1,250 2,500 3,750 5,000
N
Water & Environmental Technologies
Anaconda Deer Lodge County
Air Quality Monitoring points
Figure 1

2.0 PM10 AND TSP DATA SUMMARY

The Met One E-BAM portable PM10 monitor at Warm Springs and the TSP monitor at Opportunity collected continuous hourly data from January 1 through March 31.

During the period of operation, data recovery was 97.8% at Opportunity and 98.9% at Warm Springs. Detailed ambient air quality monitoring results for the first quarter of 2010 are summarized in the January, February and March monthly reports prepared by Kuipers & Associates. A general discussion of ambient air quality monitoring data from the first quarter of 2010 is provided in the following sections. All PM10 and TSP data are reported at Local temperature and pressure (LTP) conditions.

2.1 Opportunity Site

At the Opportunity location daily average TSP concentrations ranged from non-detectable to 28 $\mu g/m^3$ with an average of 9 $\mu g/m^3$ throughout the first quarter. The maximum daily average TSP reading of 28 $\mu g/m^3$ was observed on March 25. Moderate southwesterly winds occurred with the highest concentrations on that day, indicating that LWMA activities were probably not a contributing source. Sampling was not conducted by the adjacent ARCO South PM10 monitor on that day, so no comparison could be made between it and the ADLC E-BAM sampler. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 36 $\mu g/m^3$ in January, 31 $\mu g/m^3$ in February and 39 $\mu g/m^3$ in March. Daily average TSP concentrations for the quarter are presented in Figure 2 for the Opportunity monitoring site, and also in Appendix A.

Currently, there is no ambient air quality standard for TSP. However, all daily average TSP results for the first quarter of 2010 at Opportunity were well below the historical 24-hour Montana Ambient Air Quality Standard of 200 $\mu g/m^3$.

No Opportunity TSP data from the first quarter was rejected or omitted for quality assurance or quality control check results. However, 31 hours of data were lost when the sampler was taken offsite to repair a failed door hinge. Other, minor data losses occurred due to routine maintenance activities and a brief period of extreme cold.

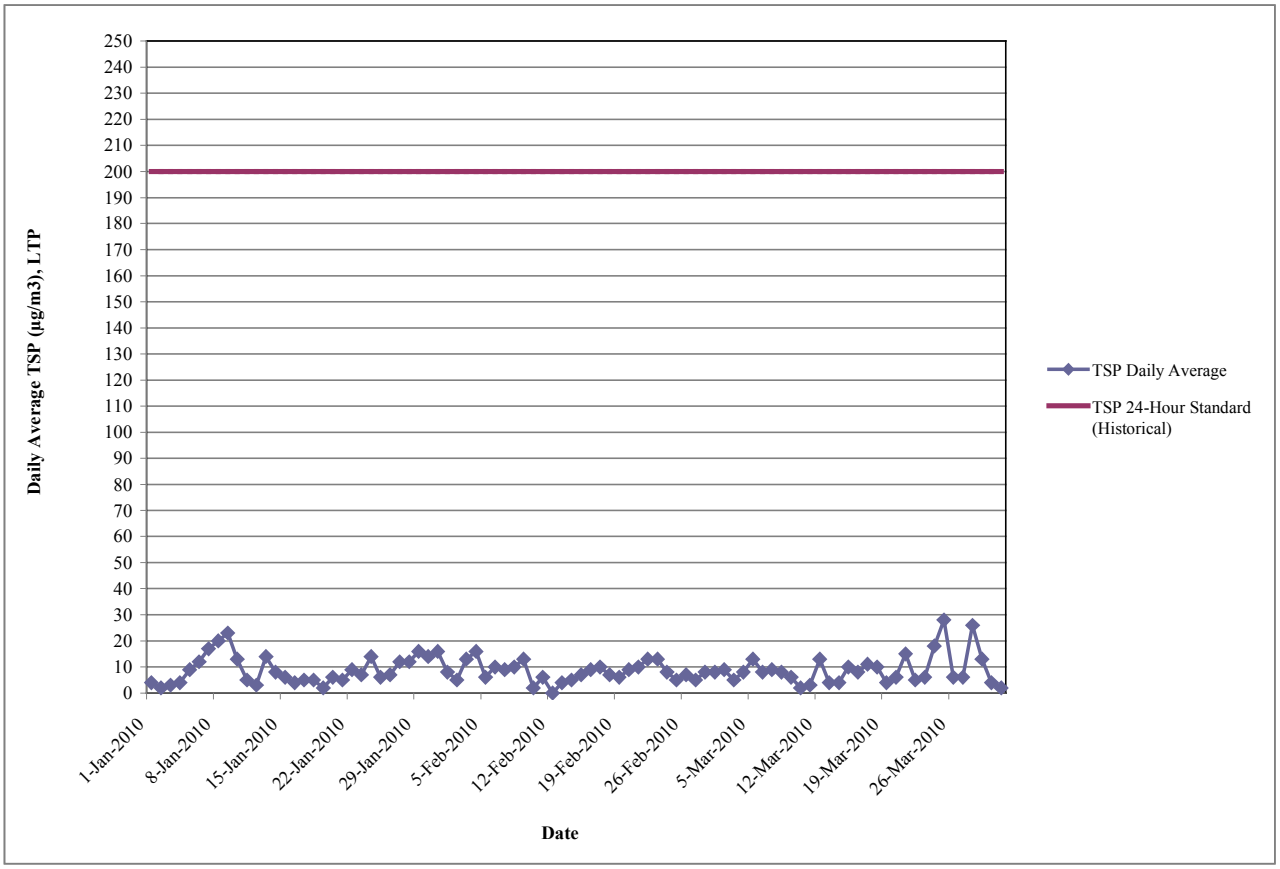

FIGURE 2– OPPORTUNITY SITE DAILY AVERAGE TSP CONCENTRATION

2.2 Warm Springs Site

At the Warm Springs location daily average PM10 concentrations ranged from 1 µg/m^3 to 22 µg/m^3 with a quarterly average of 6 µg/m^3. The maximum daily average PM10 reading of 22 µg/m^3 was observed on January 9. Winds on that day were very light and variable, suggesting air stagnation; it is unlikely that LWMA activities were a significant contributor to the PM10 levels at Warm Springs. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 24 µg/m^3 in January, and 23 µg/m^3 in February and March. Daily PM10 average concentrations for the first quarter are presented in Figure 3 for the Warm Springs monitoring site, and also in Appendix A.

All daily average PM10 results for the first quarter of 2010 at Warm Springs were well below the 24-hour Montana Ambient Air Quality Standard of 150 µg/m^3. No Warm Springs PM10 data from the first quarter was rejected or omitted for quality assurance or quality control reasons. Minor data losses occurred due to maintenance activities, and because of brief periods of extreme cold.

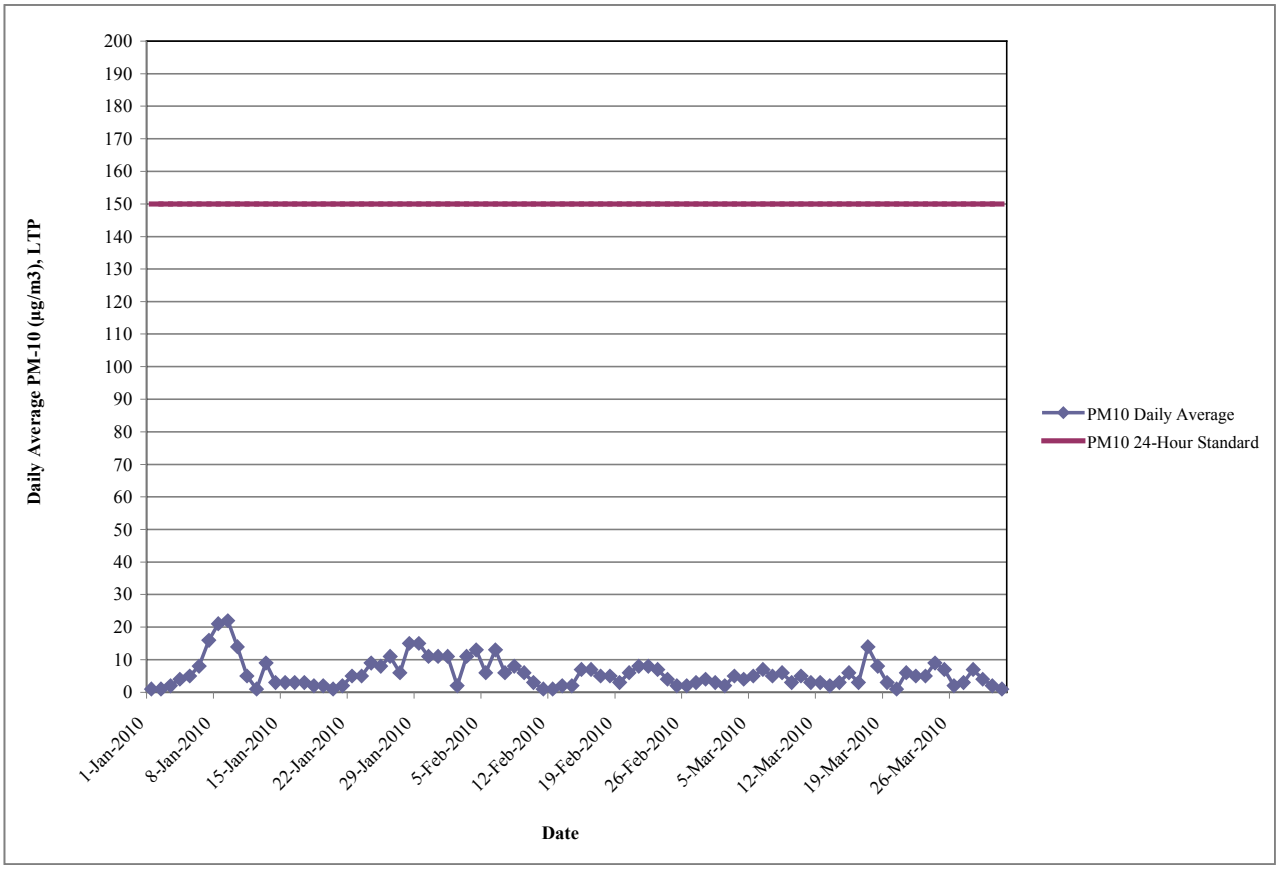

FIGURE 3 - WARM SPRINGS SITE DAILY AVERAGE PM10 CONCENTRATION

3.0 COLLOCATED PARTICULATE MONITORING RESULTS COMPARISON

Daily average (24-hour) results from the ADLC E-BAM TSP monitor at the Opportunity site were compared to the Atlantic Richfield Wedding PM10 monitors at the South Site for the quarter. The ADLC monitor collects screening level data, while the Atlantic Richfield monitors follow a federal reference method (FRM) required for compliance with air quality standards. While these are different measurements, collocated PM10 data collected at Opportunity from May 2007 through June 2008 indicated good general agreement between the E-BAM and Wedding PM10 monitoring systems. Therefore, a comparison of the E-BAM TSP data versus Wedding PM10 data should provide an indication of the ratio of total airborne particulate to the inhalable fraction (PM10).

The individual collocated results are listed in Table 1, and depicted graphically in Figure 4. While the ratio shows high day-to-day variability –particularly at lower concentrations – on average the total amount of airborne particulate (TSP) was over twice the amount of inhalable particulate (PM10). The average of the daily TSP/PM10 ratios was 2.87 to 1, while the total mass ratio was 2.15 to 1. This is consistent with the ratios observed during previous quarters, which were usually between 2:1 and 3:1. The diagonal line on Figure 4 represents a best-fit linear regression of TSP against daily average PM10 values.

TABLE 1 – COLLOCATED RESULTS FOR TSP VS. PM10
DAILY AVERAGE VALUES
FIRST QUARTER 2010
(All values are $\mu g/m^3$ at Local temperature and pressure (LTP))

Date	Standard ARCO - PM-10 Wedding FRM South Site	Test ADLC - TSP Met One E-BAM Opportunity Site	TSP as Percent of PM-10	TSP as Percent of PM-10 Cumulative
January 2, 2010	0	2	N/A	N/A
January 5, 2010	1	9	900	1100
January 8, 2010	15	20	133	194
January 11, 2010	1	5	500	212
January 14, 2010	4	8	200	210
January 17, 2010	3	5	167	204
January 20, 2010	1	6	600	220
January 23, 2010	4	7	175	214
January 26, 2010	3	7	233	216
January 29, 2010	14	16	114	185
February 1, 2010	2	8	400	194
February 4, 2010	10	16	160	188
February 7, 2010	2	9	450	197
February 10, 2010	0	2	N/A	200
February 13, 2010	0	4	N/A	207
February 16, 2010	4	9	225	208
February 22, 2010	8	13	163	203
February 25, 2010	0	5	N/A	210
February 28, 2010	5	8	160	206
March 3, 2010	3	5	167	205
March 6, 2010	8	8	100	195
March 9, 2010	2	6	300	198
March 12, 2010	5	13	260	201
March 15, 2010	5	10	200	201
March 18, 2010	2	10	500	207
March 21, 2010	6	15	250	209
March 24, 2010	8	18	225	210
March 27, 2010	2	6	300	212
March 30, 2010	0	4	N/A	**215**

Mean	287
Maximum	900
Minimum	100

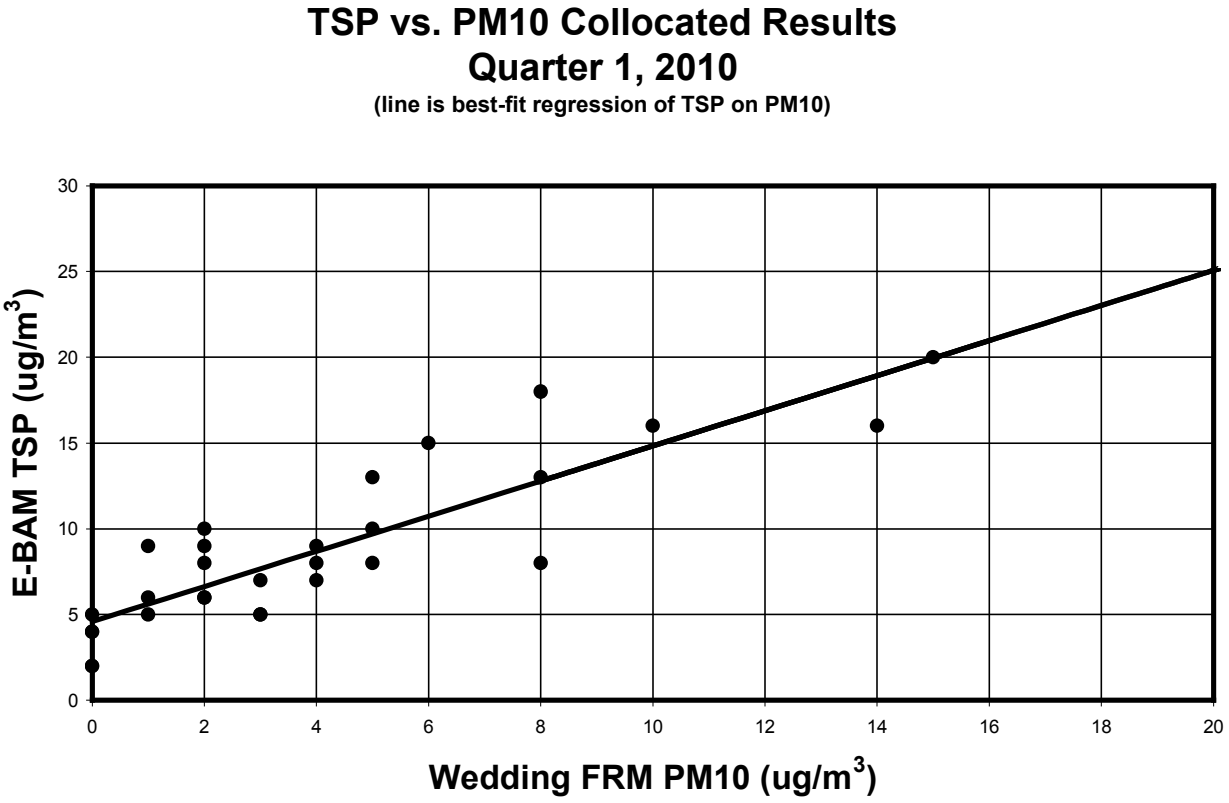

FIGURE 4 – COLLOCATED RESULTS COMPARISON FOR ADLC OPPORTUNITY E-BAM (TSP) AND ATLANTIC RICHFIELD WEDDING FRM (PM10)

4.0 DUST MONITORING RESULTS

Starting August 15, 2008, clean 9-inch diameter glass dishes were set out at both sites at a height of approximately 7 feet to capture and retain settling dust. A personal sampling pump supplied by SKC, Inc. was used to vacuum any settled dust from the dishes during twice-weekly site visits. Vacuuming could not be performed when standing water was present. In those instances, the water was allowed to evaporate, and vacuuming was performed at the next opportunity.

The vacuumed dust was collected onto 37-mm diameter, matched weight mixed cellulose ester (MCE) filter cassettes and submitted for analysis. The samples were analyzed for arsenic, cadmium, copper, lead and zinc, as well as total dust weight.

Settled dust samples were collected at both sites during the first quarter of 2010. Results are summarized in Table 2. A memorandum discussing the collection and analysis of the dust samples is presented in Appendix B, including any data quality concerns. The laboratory analytical report is presented in Attachment 1.

Additional sampling using dustfall jars was implemented in October 2008, and samples were collected during the first quarter of 2010. Those results also are summarized in Table 2.

Selected exposed filters from the ARCO South samplers at Opportunity are analyzed for arsenic and lead concentrations, in addition to PM10. Average concentrations of arsenic and lead for the ARCO samples were calculated for the first two quarters of calendar year 2010 on a total mass basis, using the four days with PM10 concentrations of 10 $\mu g/m^3$ or more. Recognizing the very small sample size, a result of 44 mg/kg was obtained for arsenic and 152 mg/kg for lead. Although the sampling methods are much different, and the ARCO samplers collect only PM10 (rather than total particulate), the arsenic and lead concentrations shown in Table 2 are of the same order of magnitude as those calculated for the ARCO air samples – somewhat higher for arsenic, and lower for lead.

In general the trace element concentrations were similar for the Opportunity and Warm Springs sites, and were also similar between the settled dust versus dustfall jar samples. However, the zinc concentrations were significantly higher in the dustfall jar particulate compared to the settled dust collected in the glass dishes.

TABLE 2 – SUMMARY OF DUST MONITORING RESULTS

Samples collected January 1 – March 28, 2010				
Analyte (mg/kg)	**Opportunity**		**Warm Springs**	
	Settled Dust	**Dustfall**	**Settled Dust**	**Dustfall**
As	53.4	60.0	60.4	87.0
Cd	2.73	3.23	3.30	7.77
Cu	275	266	295	255
Pb	79.5	78.5	139	131
Zn	531	1171	515	886
Dustfall Rate (g/m^2/month) (1)	N/A	0.16	N/A	0.19
(1) Based on 30-day month				

5.0 METEOROLOGICAL DATA SUMMARY

Meteorological data were collected continuously and recorded hourly at both the Opportunity and Warm Springs E-BAM monitoring sites. Parameters monitored include wind direction, wind speed, temperature and relative humidity. The data were collected at a height of approximately eight feet above ground level.

Summarized meteorological data for these sites are presented and discussed in Sections 5.1 and 5.2. Detailed daily meteorological summaries are presented in Appendix A. Information presented includes:

- Average, maximum and minimum air (shade) temperature for each day,
- Average and maximum hourly average wind speed for each day,
- Resultant wind direction for each day (weighted by wind speed – this is the mean direction from which the wind was blowing), and
- Average daily relative humidity.

Additionally, the summaries in Appendix A show the average daily and maximum daily PM10 and TSP concentrations, to facilitate correlation with the meteorological data.
Section 5.3 presents wind rose summaries for periods with elevated PM10 and TSP concentrations.

5.1 Opportunity Site

Figure 5 summarizes the meteorological data for the Opportunity site. Winds were generally light, averaging 1.9 m/s (4.3 mph). The highest recorded hourly wind speed was 6.4 m/s (14.3 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were above normal in January and March, and near normal in February. Monthly averages were –4.1°C (24.6°F) in January, -3.4°C (25.9°F) in February and 2.1°C (35.8°F) in March. Temperature extremes ranged from a low of less than –30.0°C (-22.0°F) in January to a high of 15.1°C (59.2°F) in March. The average humidity for the quarter was 64%, with considerable daily variation.

Winds at the Opportunity site were mostly from the southwest through south-southeast, though north-northeasterly winds also were fairly common. The strongest winds tended to be from the southwest, and from the south-southeast.

Total precipitation at Opportunity was only 0.24 inches in January, 0.02 inches in February and 0.41 inches in March. A snow cover was absent at both sites over much of the winter.

Minor meteorological data losses occurred due to routine maintenance, but none occurred due to data quality issues. Additionally, 42 hours of wind data were invalidated during the quarter because of suspected instrument icing. Finally, 31 hours of meteorological data were missed in late February because the EBAM unit was taken offsite to repair a broken door hinge.

Part 1 – Means and Extremes

Parameter	January	February	March	Quarter
Average Wind Speed, m/s	1.8	1.7	2.2	1.9
Maximum (hourly) Wind Speed, m/s	5.3	5.8	6.4	6.4
Average Temperature, °C	-4.1	-3.4	2.1	-1.7
Maximum Temperature, °C	9.3	8.6	15.1	15.1
Minimum Temperature, °C	<-30.0	-18.7	-10.5	<-30.0
Total Precipitation, inches	0.24	0.02	0.41	0.67
Average Relative Humidity, %	68	68	58	64
Refer to Appendix A for detailed daily meteorological summaries.				

Part 2 – Quarter 1, 2010 Wind Rose

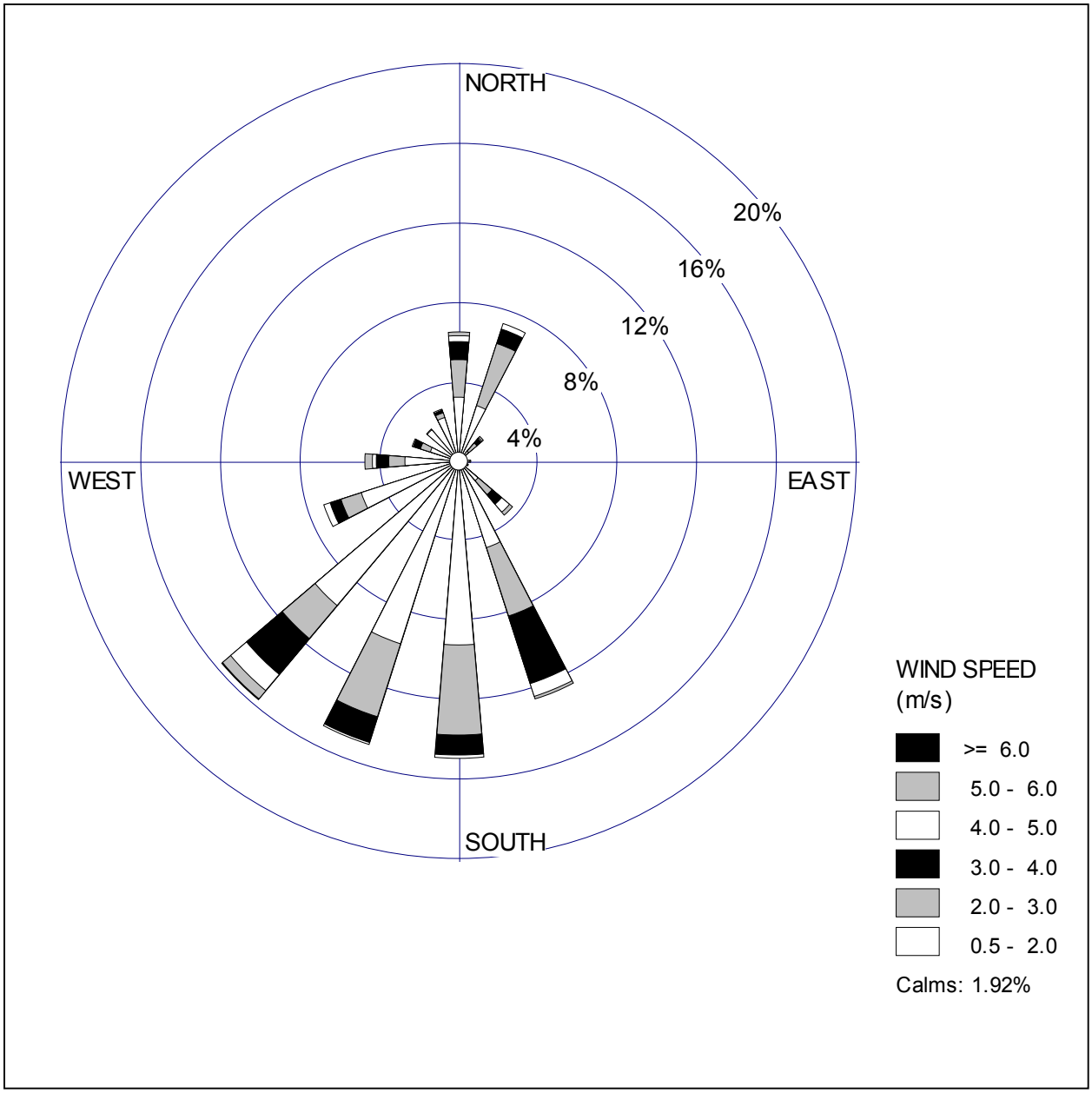

FIGURE 5 – METEOROLOGICAL SUMMARY FOR OPPORTUNITY SITE

5.2 Warm Springs Site

Figure 6 summarizes the meteorological data for the Warm Springs site. Winds were generally light, averaging 1.9 m/s (4.3 mph). The highest recorded hourly wind speed was 6.9 m/s (15.4 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were above normal in January and March, and near normal in February. Monthly averages were –4.4°C (24.1°F) in January, -3.3°C (26.1°F) in February and 2.6°C (36.7°F) in March. Temperature extremes ranged from a low of less than –30.0°C (-22.0°F) in January to a high of 16.6°C (61.9°F) in March. The average humidity for the quarter was 64%, with considerable daily variation.

Winds at the Warm Springs site were mostly from southerly directions, with occasional northerly winds. Southerly winds tended to be the strongest.

Minor meteorological data losses occurred due to routine maintenance, but none occurred due to data quality issues. However, 89 hours wind data were invalidated due to suspected icing conditions. Additionally, 16 hours of relative humidity data were lost because of a faulty signal cable connection.

Part 1 – Means and Extremes

Parameter	January	February	March	Quarter
Average Wind Speed, m/s	1.9	1.6	2.1	1.9
Maximum (hourly) Wind Speed, m/s	6.3	5.9	6.9	6.9
Average Temperature, °C	-4.4	-3.3	2.6	-1.7
Maximum Temperature, °C	9.6	10.0	16.6	16.6
Minimum Temperature, °C	<-30.0	-19.3	-10.7	<-30.0
Average Relative Humidity, %	67	68	58	64
Refer to Appendix A for detailed daily meteorological summaries.				

Part 2 – Quarter 1, 2010 Wind Rose

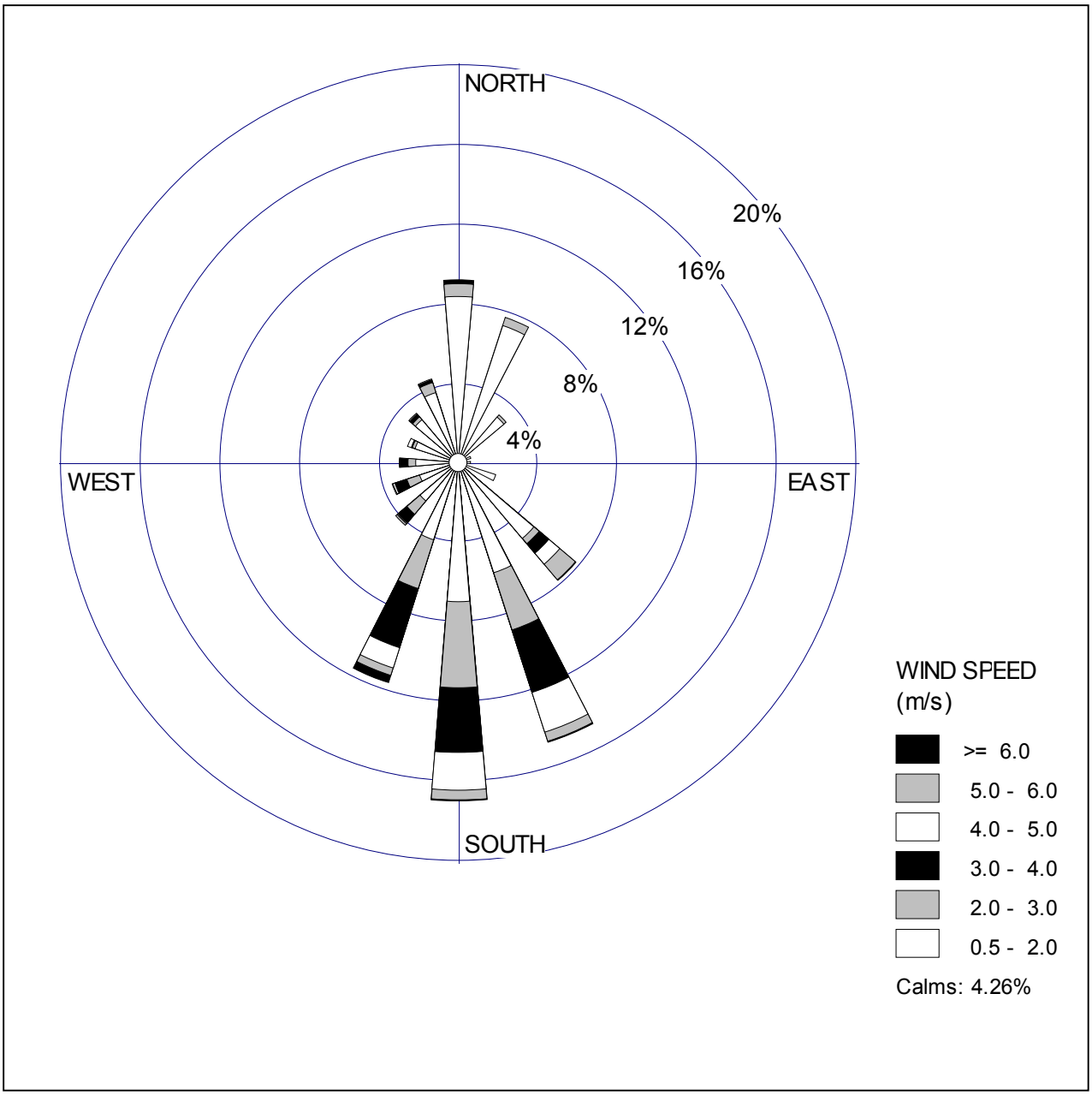

FIGURE 6 – METEOROLOGICAL SUMMARY FOR WARM SPRINGS SITE

5.3 Meteorological Conditions and Particulate Concentrations

Additional wind roses were generated for both monitoring sites to depict wind patterns during periods of elevated particulate concentrations – with the Opportunity site shown in Figure 7 and the Warm Springs site shown in Figure 8. For this analysis, "elevated" was defined as TSP concentrations greater than or equal to 30 $\mu g/m^3$ at Opportunity, and PM10 concentrations of greater than or equal to 23 $\mu g/m^3$ at Warm Springs. These thresholds – corresponding to roughly the 95th percentile at both sites– were used to ensure that a sufficient volume of data was incorporated to produce meaningful wind rose results.

When comparing the wind roses for the Opportunity site (Figures 5 and 7), it is evident that wind speeds were often higher during elevated TSP conditions. This is reasonable, since the larger – and therefore heavier – particulates collected by a TSP monitor would require greater wind activity to be entrained into the air. The wind direction distribution during elevated TSP periods was also notably different from the overall pattern, with north-northeast winds being very ***infrequent***. This is different from many previous calendar quarters, when winds from the north through north-northeast were pronounced during high TSP periods. This indicates less potential impact from the LWMA than during previous quarters.

The corresponding wind roses for the Warm Springs site (Figures 6 and 8) show that winds were often lighter during elevated PM10 periods, and quite variable in direction. This suggests that elevated PM10 periods at Warm Springs were usually associated with regional air stagnation conditions, and not the LWMA.

These comparisons indicate that overall ambient particulate conditions at both sites were not significantly affected by LWMA activities during the first quarter.

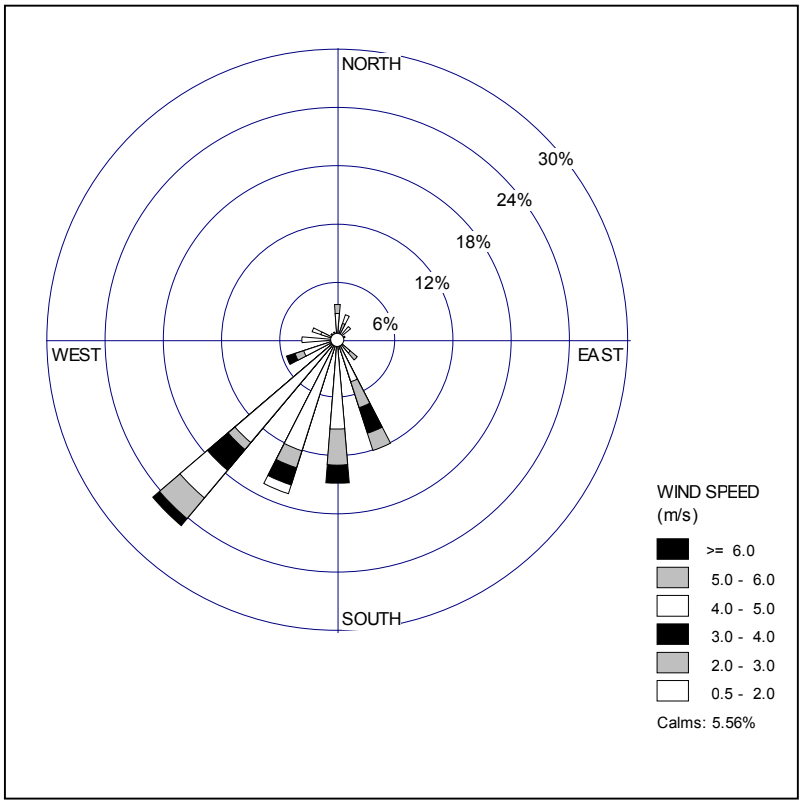

FIGURE 7 – OPPORTUNITY WIND ROSE FOR ELEVATED TSP PERIODS

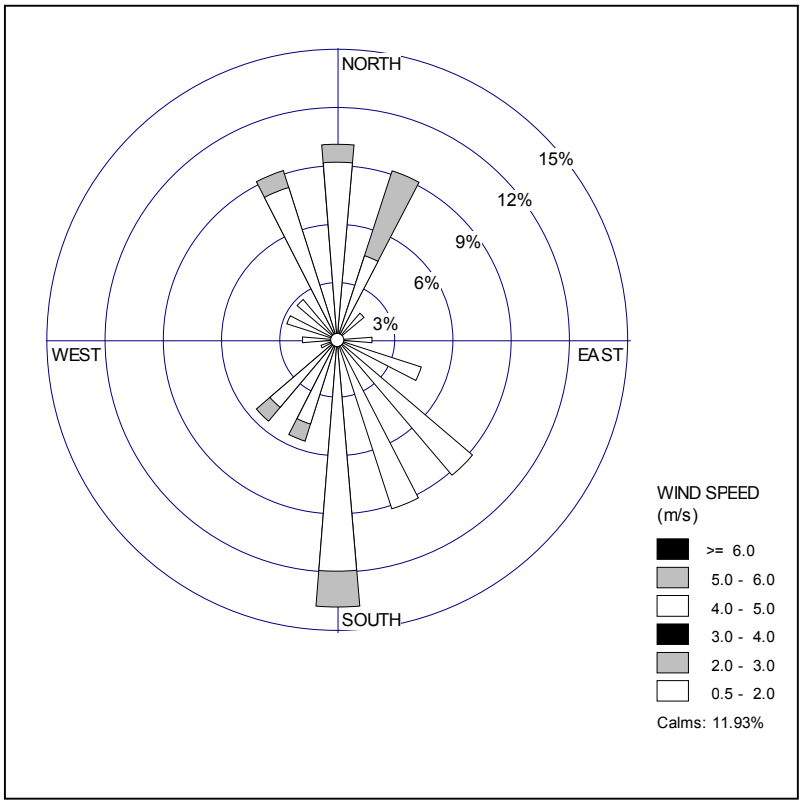

FIGURE 8 – WARM SPRINGS WIND ROSE FOR ELEVATED PM10 PERIODS

6.0 DATA QUALITY SUMMARY

Data quality is an integral part of any ambient monitoring program. The data collected must be of a known quality to be used for evaluation of local air quality and meteorological characteristics. This is particularly important when an objective of a monitoring program is to identify possible emission sources, and meteorological events associated with certain ambient air quality conditions – in this case, elevated PM10 or TSP levels.

The Opportunity and Warm Springs monitoring systems were checked and/or calibrated (as appropriate for each monitoring parameter) monthly during the first quarter of 2010. This was accomplished via performance checks using standards that were either:

- Traceable to NIST; or
- Otherwise certified by the test equipment manufacturer.

Each instrument response was recorded, and evaluated to determine whether it fell within its respective acceptance range. In the event that a response fell outside (or near the limits of) the applicable acceptance range, the monitor or sensor in question was adjusted or recalibrated as appropriate. Such results then must be evaluated, in conjunction with a detailed data review, to identify data periods that must be flagged or invalidated.

Minor sampler maintenance was also performed on a monthly basis. Additionally, data were reviewed frequently via satellite link, and inspected for any suspicious behavior requiring investigation.

6.1 Summary of Performance Check / Maintenance Activities

Performance checks and minor maintenance were conducted on a monthly basis. Table 3 summarizes checks and maintenance for the E-BAM sampler itself, while Table 4 lists the meteorological checks. Information presented includes:

- The instrument model and serial number for each component of the monitoring system;
- Each type of check/maintenance performed on that component;
- Performance acceptance ranges; and
- A description of the calibration standard (and its traceability) used to perform each check.

6.2 Data Quality Issues

In general, performance checks and maintenance activities conducted throughout the first quarter of 2010 indicated that the E-BAM samplers were meeting performance objectives. The performance check procedures and routine maintenance activities are discussed in detail in Appendix C. Results for the first quarter of 2010 are presented in Appendix D. All E-BAM sampler test results obtained during the first quarter of 2010 were satisfactory.

Causes of data losses during the first quarter included the following:

- All EBAM data at Opportunity was lost for 31 hours in February because the sampler's door hinge broke, requiring it to be taken offsite for repair.
- Three hours of particulate data were invalidated at each site because of suspicion that the readings were affected by snow events.
- 42 hours of wind data at Opportunity, and 89 hours at Warm Springs were invalidated because of suspected icing conditions.
- At Warm Springs 16 hours of relative humidity data were lost due to a faulty signal cable connection.
- Minor data losses occurred at both sites in January, when severe cold (temperatures below –30.0°C (-22.0°F) caused the samplers to stop operating. This occurred for 6 hours at Opportunity and 17 hours at Warm Springs.
- Additional minor data losses occurred at both sites due to routine maintenance and short power outages.

TABLE 3 – SUMMARY OF PERFORMANCE CHECKS
E-BAM SAMPLER

Met One E-BAM PM_{10} and TSP Samplers

Instrument	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
Particulate Sampler	E-BAM	F7290 (TSP)	F7289 (PM_{10})	Leak Check	<1.5 LPM	BX-302 valve	N/A
				Operating Flow	+/- 2% (+/- 0.33 LPM)	Delta Cal S/N 000498	MFR/NIST
				Pump Test	(1)	BX-302 valve	N/A
				Zero/Span	Pass / Fail	Membrane Plates	MFR
				Clean Vane & Nozzle	(2)	N/A	N/A
				Clean PM10 Head	N/A	N/A	N/A
Barometer (3)	E-BAM	F7290	F7289	Collocated	+/- 2 mmHg	Aneroid Barometer	Mercury Barometer

Explanatory Notes for Table 3

N/A = Not applicable
MFR/NIST = Certified traceable to NIST by the manufacturer
MFR = Certified accurate per Met One's E-BAM-6100 Final Test Procedure
(1) Acceptance range varies with test flow rate, see Appendix C for discussion.
(2) Leak check performed following cleaning, result must be <1.5 LPM.
(3) Barometer is internal to E-BAM sampler.

TABLE 4 – SUMMARY OF PERFORMANCE CHECKS METEOROLOGICAL INSTRUMENTS

Met One Meteorological Instruments

Instrument (1)	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
Temperature	9250	F9487	F9481	Collocated	+/- 0.5 °C	Assmann Psychrometer	NIST
Relative Humidity	593	F9346	F9349	Collocated	+/- 5% Relative Humidity	Assmann Psychrometer	NIST
Wind Speed	0348	G2181	G2187	Collocated	+/- 0.5 m/s	Met One 010 Sensor	NIST
				Rotation Check	+/- 0.2 m/s	Synchronous Motor	MFR
Wind Direction	0348	G2181	G2187	Initial Alignment	+/- 2 degrees	Solar Sighting	NIST Time
				Linearity	+/- 3 degrees	Visual Crossarm Alignment (2)	N/A

Explanatory Notes for Table 4

(1) All meteorological instruments include certificate of NIST traceability from Met One, valid for a period of one year.
(2) Linearity checked by visually aligning wind vane in 90-degree increments with respect to crossarm.

MFR = Motor rotation rate provided by manufacturer.

7.0 AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES

Invalid hours for the quarter are summarized in Table 5 for the Opportunity site, and Table 6 for the Warm Springs site. The complete PM10 and TSP data sets for the quarter, and current qualifier codes are presented in Appendix E.

TABLE 5 – OPPORTUNITY SITE INVALID DATA PERIODS (QUARTER 1, 2010)

Part A – TSP

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-5-2010	2200-2300		Suspect snow effects	AM
1-6-2010	0000-0100	0500-0800	Suspect snow effects	AM
1-7-2010	0300-0800	1000-1500	Ambient temp <-30ºC	AO
1-13-2010	1600	2300	Monthly checks	BA
2-21-2010	1700-1800		Monthly checks	BA
2-22-2010		0000-0100	Monthly checks	BA
2-25-2010	1200-2300	1900-2300	Removed for repair	BA
2-26-2010	0000-1800	0000-2300	Removed for repair	BA
2-27-2010		0000-0100	Removed for repair	BA
3-14-2010	1800		Tape change	BA
3-15-2010		0100	Tape change	BA
3-18-2010	2200		Suspect snow effects	AM
3-19-2010		0500	Suspect snow effects	AM
3-19-2010	0100	0800	Data not recorded	AN
3-28-2010	1500	2200	Monthly checks	BA

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-26-2010	2200-2300		Instrument icing	AO
1-27-2010	0000-1000	0500-1700	Instrument icing	AO
1-28-2010	1800		Monthly checks	BA
1-29-2010		0100	Monthly checks	BA
2-17-2010	1800-2300		Instrument icing	AO
2-18-2010	0000-1100	0100-1800	Instrument icing	AO
2-21-2010	1800		Monthly checks	BA
2-22-2010		0100	Monthly checks	BA
2-25-2010	1200-2300	1900-2300	Removed for repair	BA
2-26-2010	0000-1700	0000-2300	Removed for repair	BA
2-27-2010		0000	Removed for repair	BA
3-19-2010	0100	0800	Data not recorded	AN
3-28-2010	1500	2200	Monthly checks	BA
3-30-2010	0100-1100	0800-1800	Instrument icing	AO

Part C – Temperature / Relative Humidity

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-7-2010	0300-0800	1000-1500	Ambient temp <-30ºC	AO
2-25-2010	1200-2300	1900-2300	Removed for repair	BA
2-26-2010	0000-1700	0000-2300	Removed for repair	BA
2-27-2010		0000	Removed for repair	BA
3-19-2010	0100	0800	Data not recorded	AN

TABLE 6 – WARM SPRINGS SITE INVALID DATA PERIODS (QUARTER 1, 2010)

Part A – PM10

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-5-2010	2300		Suspect snow effects	AM
1-6-2010	0000-0100	0600-0800	Suspect snow effects	AM
1-6-2010	2100		Ambient temp <-30ºC	AO
1-7-2010	0000-1000, 2200, 2300	0400, 0700-1700	Ambient temp <-30ºC	AO
1-8-2010	0200, 0400, 0500	0500, 0600, 0900, 1100, 1200	Ambient temp <-30ºC	AO
1-13-2010	1500	2200	Monthly checks	BA
2-21-2010	1600	2300	Monthly checks	BA
3-28-2010	1200	1900	Monthly checks	BA

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-5-2010	2000-2300		Instrument icing	AO
1-6-2010	0000-2300	0300-2300	Instrument icing	AO
1-7-2010	0000-2300	0000-2300	Instrument icing	AO
1-8-2010	0000-1700	0000-2300	Instrument icing	AO
1-9-2010		0000	Instrument icing	AO
1-26-2010	1700-2300		Instrument icing	AO
1-27-2010	0000-1100	0000-1800	Instrument icing	AO
1-28-2010	1700		Monthly checks	BA
1-29-2010		0000	Monthly checks	BA
2-21-2010	1600	2300	Monthly checks	BA
3-28-2010	1300	2000	Monthly checks	BA

Part C – Temperature / Relative Humidity

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-6-2010	2100		Ambient temp <-30ºC	AO
1-7-2010	0000-1000, 2200, 2300	0400, 0700-1700	Ambient temp <-30ºC	AO
1-8-2010	0200, 0400, 0500	0500, 0600, 0900, 1100, 1200	Ambient temp <-30ºC	AO
2-6-2010	0700-0800	1400-1500	Suspect faulty connection	AN (1)
2-9-2010	0400-0900	1100-1600	Suspect faulty connection	AN (1)
2-10-2010	1900-2300		Suspect faulty connection	AN (1)
2-11-2010	1900-2100	0200-0600	Suspect faulty connection	AN (1)
2-12-2010		0200-0400	Suspect faulty connection	AN (1)
(1) Only relative humidity was invalid during these periods				

8.0 REFERENCES

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APPENDIX A

MONTHLY DATA SUMMARIES
FIRST QUARTER 2010

OPPORTUNITY DAILY DATA SUMMARY - JANUARY 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	(c) Average Temperature (deg C)	Maximum Temperature (deg C)	(c) Minimum Temperature (deg C)	Average Relative Humidity (percent)	Total Precip. (inches)
1	4	23	2.7	4.0	174	1.4	4.7	-1.6	65	0.05
2	2	30	1.7	3.6	215	0.6	3.2	-2.6	69	0.00
3	3	17	1.6	2.9	183	-2.3	2.1	-6.1	67	0.00
4	4	23	2.4	3.6	169	-0.6	2.4	-3.9	65	0.00
5	9	136	3.3	5.1	246	-0.1	4.4	-14.0	74	0.05
6	12	32	1.5	3.5	359	-18.4	-13.5	-27.1	64	0.02
7	17	40	1.0	2.4	321	-24.5	-17.7	-30.0	67	0.00
8	20	63	0.9	1.9	326	-19.4	-13.2	-26.7	69	0.00
9	23	46	1.1	2.5	196	-9.8	-3.8	-16.7	71	0.00
10	13	38	1.3	2.5	220	-8.5	-1.2	-14.9	79	0.00
11	5	23	3.6	4.6	169	2.3	8.3	-2.8	57	0.00
12	3	20	2.7	4.1	176	4.4	7.2	1.8	55	0.00
13	14	58	2.2	3.7	184	3.6	8.0	0.1	64	0.00
14	8	45	2.2	5.1	236	1.2	4.2	-1.8	66	0.00
15	6	19	3.3	4.7	199	3.2	7.5	0.1	43	0.00
16	4	12	2.4	5.3	209	3.6	6.9	1.1	50	0.00
17	5	33	2.3	4.2	166	3.0	9.3	-0.6	54	0.00
18	5	24	2.3	2.9	166	3.2	7.2	-0.2	52	0.00
19	2	12	1.9	4.7	200	1.3	4.2	-2.2	64	0.00
20	6	32	1.8	3.0	179	-1.2	5.5	-5.0	61	0.00
21	5	19	1.4	3.0	197	-1.5	5.7	-8.0	61	0.00
22	9	44	1.4	2.7	9	-7.0	-4.1	-9.9	79	0.02
23	7	35	0.8	1.6	323	-9.0	-6.3	-13.2	79	0.04
24	14	42	0.8	1.6	203	-10.2	-0.5	-16.7	74	0.00
25	6	22	1.6	3.7	169	-5.8	1.1	-14.4	75	0.00
26	7	22	1.3	2.6	87	-3.8	-0.5	-6.7	84	0.05
27	12	35	1.1	2.2	261	-4.6	-0.6	-9.6	79	0.01
28	12	36	1.5	3.3	183	-9.1	-4.9	-14.1	77	0.00
29	16	58	1.0	2.1	342	-5.4	-0.3	-10.3	75	0.00
30	14	43	0.9	1.5	239	-7.3	1.5	-13.4	78	0.00
31	16	34	0.9	2.8	27	-5.9	-1.7	-9.4	80	0.00

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds
(c) Temperature sensor's lower limit is -30C, hourly values set to -30C during colder periods

OPPORTUNITY DAILY DATA SUMMARY - FEBRUARY 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)	Total Precip. (inches)
1	8	37	1.6	3.5	215	-3.3	2.5	-7.9	72	0.00
2	5	34	2.0	4.0	209	-2.0	1.9	-8.9	65	0.00
3	13	34	1.2	2.4	244	-6.0	2.9	-11.0	73	0.00
4	16	47	1.0	2.4	322	-6.8	0.2	-11.4	77	0.00
5	6	24	2.3	4.2	153	-1.5	2.0	-7.2	72	0.00
6	10	32	0.9	2.3	234	-2.1	4.8	-6.4	77	0.00
7	9	27	1.0	2.1	349	-6.0	-1.1	-13.8	76	0.00
8	10	24	1.0	3.1	18	-11.5	-4.7	-16.9	78	0.00
9	13	46	1.2	2.6	195	-8.5	-2.9	-15.9	74	0.00
10	2	19	2.3	3.7	221	-2.6	0.5	-4.9	58	0.00
11	6	30	2.5	4.1	198	-0.8	3.2	-4.9	61	0.00
12	0	15	2.4	3.7	240	3.0	6.8	1.3	60	0.00
13	4	31	2.0	3.6	304	0.6	3.7	-4.7	64	0.00
14	5	39	2.0	4.3	154	-1.8	4.3	-7.3	66	0.00
15	7	26	1.0	1.8	312	-0.2	3.9	-3.5	79	0.00
16	9	33	1.2	2.8	193	-1.2	2.1	-4.1	77	0.00
17	10	33	1.6	3.9	342	-1.5	3.1	-5.6	81	0.02
18	7	21	1.5	2.3	351	-4.9	-2.0	-11.1	72	0.00
19	6	49	1.7	4.5	345	-6.2	-2.6	-10.9	72	0.00
20	9	27	1.8	5.8	4	-9.9	-5.0	-14.8	69	0.00
21	10	27	1.1	2.3	174	-11.5	-4.2	-18.7	64	0.00
22	13	28	1.4	2.5	132	-8.6	-0.2	-16.2	61	0.00
23	13	53	1.9	2.9	191	-2.4	8.3	-11.7	51	0.00
24	8	50	3.3	4.8	198	1.3	4.4	-1.6	52	0.00
25	5	25	1.3	2.6	218	-0.9	2.7	-3.1	68	0.00
26	7	8	3.0	3.8	156	1.9	3.8	1.2	53	0.00
27	5	21	2.2	4.8	146	2.7	8.6	-3.7	53	0.00
28	8	28	1.2	2.8	113	0.3	7.3	-3.7	70	0.00

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

OPPORTUNITY DAILY DATA SUMMARY - MARCH 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)	Total Precip. (inches)
1	8	21	1.7	3.1	174	0.7	10.7	-5.1	62	0.00
2	9	33	2.3	3.8	181	4.0	9.3	-1.0	50	0.00
3	5	30	2.0	4.3	164	4.4	10.5	-0.3	69	0.00
4	8	29	1.4	3.2	359	1.1	5.1	-2.7	79	0.00
5	13	45	1.2	2.7	349	0.4	7.4	-4.8	73	0.00
6	8	28	1.4	3.2	175	1.2	10.6	-6.5	64	0.00
7	9	20	1.8	3.8	213	2.1	11.5	-3.0	57	0.00
8	8	24	1.8	2.9	188	2.6	11.0	-3.5	56	0.00
9	6	14	2.2	3.3	8	-1.5	0.6	-3.5	84	0.08
10	2	8	1.8	3.6	341	-3.7	0.6	-7.8	65	0.00
11	3	20	2.7	4.2	201	-2.2	4.5	-10.5	51	0.00
12	13	33	4.0	5.7	153	3.2	9.7	-1.8	48	0.00
13	4	20	2.0	3.9	303	1.1	2.8	-0.5	64	0.07
14	4	16	1.3	1.9	347	1.6	9.5	-2.8	60	0.00
15	10	32	1.7	3.4	155	2.9	12.0	-3.3	57	0.00
16	8	28	2.5	5.8	207	7.4	15.1	-0.3	39	0.00
17	11	29	3.3	5.7	23	6.5	11.6	1.2	47	0.00
18	10	34	2.7	5.3	15	0.8	5.8	-3.6	53	0.01
19	4	16	1.5	3.4	356	-2.5	2.9	-6.6	60	0.00
20	6	16	2.4	3.8	203	2.2	10.1	-6.5	41	0.00
21	15	43	3.1	5.8	220	6.1	13.6	0.5	45	0.00
22	5	17	2.8	5.6	277	2.6	6.1	-0.3	62	0.00
23	6	17	1.6	3.4	354	0.3	6.4	-5.1	60	0.00
24	18	57	1.7	3.3	210	1.7	11.6	-6.8	49	0.00
25	28	314	2.4	4.4	211	3.5	9.7	-0.9	55	0.00
26	6	31	3.1	5.8	269	1.6	5.1	-2.6	56	0.00
27	6	28	2.3	3.2	236	3.9	10.9	-1.4	45	0.00
28	26	110	3.4	6.4	193	6.6	12.8	0.2	37	0.00
29	13	48	2.7	4.4	205	6.6	10.8	2.4	63	0.08
30	4	20	2.0	3.2	238	0.4	3.5	-2.8	76	0.16
31	2	13	1.8	4.4	269	-1.0	3.9	-5.2	65	0.01

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - JANUARY 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	(c) Average Temperature (deg C)	Maximum Temperature (deg C)	(c) Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	1	23	3.8	4.9	168	2.4	5.8	-0.5	64
2	1	10	2.2	3.8	214	0.9	4.8	-3.1	70
3	2	10	1.6	3.9	200	-2.5	3.2	-6.3	71
4	4	17	1.7	3.9	171	-1.1	4.3	-4.8	72
5	5	21	2.6	4.5	190	-0.8	3.4	-15.3	78
6	8	26	NO DATA	NO DATA	NO DATA	-19.5	-14.6	-30.0	67
7	16	26	NO DATA	NO DATA	NO DATA	-26.7	-19.5	-30.0	67
8	21	48	0.3	0.4	206	-21.8	-14.3	-30.0	70
9	22	37	0.8	1.3	15	-11.1	-4.5	-18.1	72
10	14	37	0.9	1.5	57	-10.5	-3.2	-16.4	79
11	5	22	3.0	5.0	160	0.5	9.6	-15.2	59
12	1	8	4.3	6.3	162	6.3	8.7	4.5	50
13	9	33	2.2	3.6	169	4.1	8.6	-0.7	64
14	3	28	2.3	4.0	224	1.5	5.7	-2.0	66
15	3	9	4.9	6.1	175	4.1	8.2	0.6	42
16	3	10	2.5	4.2	186	4.3	7.9	0.2	49
17	3	21	2.5	4.4	163	3.9	9.4	-3.5	53
18	2	12	3.7	4.8	154	4.7	8.8	2.3	49
19	2	13	2.3	3.9	178	2.1	6.0	-2.6	64
20	1	12	2.6	3.8	175	0.1	5.8	-5.3	57
21	2	25	1.8	3.4	166	-1.3	6.1	-10.8	61
22	5	19	1.1	2.0	28	-7.2	-3.0	-11.1	79
23	5	26	0.7	1.1	39	-9.6	-6.3	-15.8	79
24	9	35	0.8	1.4	169	-10.7	-2.3	-17.7	73
25	8	21	0.8	1.5	33	-7.5	0.0	-15.0	66
26	11	29	0.6	0.8	39	-4.6	-0.5	-10.4	81
27	6	29	0.8	1.4	16	-4.8	-0.2	-10.6	78
28	15	36	0.8	1.5	34	-11.9	-4.6	-17.8	77
29	15	31	0.8	1.5	95	-6.3	1.7	-15.2	76
30	11	39	0.7	1.2	171	-7.9	1.7	-15.0	78
31	11	26	0.7	2.0	19	-6.0	-1.2	-10.5	81

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds
(c) Temperature sensor's lower limit is -30C, hourly values set to -30C during colder periods

WARM SPRINGS DAILY DATA SUMMARY - FEBRUARY 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	11	38	0.9	2.8	226	-5.2	3.5	-9.9	80
2	2	14	2.2	3.8	195	-1.5	3.8	-9.0	67
3	11	31	0.8	1.6	20	-9.1	-3.1	-15.3	77
4	13	53	0.9	1.6	109	-6.5	0.7	-12.7	76
5	6	15	1.6	3.4	155	-1.3	3.9	-8.0	72
6	13	35	0.8	1.5	56	-1.9	5.2	-5.5	80
7	6	20	1.1	1.7	196	-5.2	-0.7	-10.1	75
8	8	23	0.8	1.7	358	-10.7	-6.1	-15.0	81
9	6	22	1.3	2.4	196	-7.7	-2.0	-15.6	70
10	3	16	2.3	3.8	202	-2.5	2.2	-5.7	58
11	1	11	2.6	3.7	185	-0.5	4.5	-3.4	59
12	1	11	2.2	3.6	235	3.2	8.4	-1.5	61
13	2	16	1.4	2.9	300	0.9	5.2	-3.4	67
14	2	15	1.6	3.4	184	-1.5	6.1	-7.1	68
15	7	28	0.8	1.4	7	-0.1	6.2	-4.3	79
16	7	18	0.9	1.6	334	-2.4	1.8	-8.3	80
17	5	23	1.2	2.3	350	-1.2	4.6	-5.7	80
18	5	27	1.0	1.9	2	-4.7	-0.8	-12.1	70
19	3	16	1.2	3.0	11	-6.4	-1.3	-13.1	71
20	6	20	1.4	3.3	356	-10.6	-4.5	-16.9	69
21	8	23	1.2	2.1	195	-12.4	-3.9	-19.3	65
22	8	29	1.0	1.8	10	-9.7	0.7	-18.5	63
23	7	34	1.7	4.4	208	-4.0	10.0	-15.5	57
24	4	12	3.5	5.9	166	2.4	6.4	-1.1	49
25	2	36	2.0	3.9	238	1.3	6.2	-4.3	59
26	2	15	3.8	5.9	152	0.2	6.2	-7.2	54
27	3	12	2.3	5.3	149	3.4	9.4	-3.8	53
28	4	25	0.9	1.5	115	0.6	9.3	-4.5	71

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - MARCH 2010

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	3	31	1.7	3.4	188	0.9	12.3	-6.4	63
2	2	7	3.0	4.4	171	4.8	10.6	-1.9	49
3	5	29	1.7	3.5	162	4.9	12.1	-0.2	68
4	4	20	1.1	2.0	337	1.3	6.6	-3.7	80
5	5	27	1.0	2.0	14	0.2	9.0	-6.1	74
6	7	36	1.1	2.0	184	1.4	12.4	-6.8	65
7	5	24	1.7	3.2	174	2.2	12.2	-4.7	59
8	6	24	1.7	3.7	184	2.5	12.2	-5.2	59
9	3	17	1.1	1.7	17	-1.1	0.7	-3.4	83
10	5	17	1.1	1.6	18	-3.8	1.4	-9.4	65
11	3	17	3.2	5.0	184	-1.9	6.0	-10.7	53
12	3	8	4.1	5.8	150	4.8	9.8	0.4	44
13	2	9	1.7	3.2	242	2.3	4.3	-0.4	58
14	3	30	1.1	1.6	337	1.7	10.5	-4.6	61
15	6	26	1.2	2.1	34	2.5	13.2	-6.9	60
16	3	12	2.7	4.8	181	7.4	16.6	-5.5	42
17	14	52	2.1	2.9	56	7.3	12.9	1.4	46
18	8	26	1.8	4.1	357	1.4	7.2	-4.7	51
19	3	22	1.3	2.9	354	-2.4	3.9	-6.7	63
20	1	12	3.1	4.8	180	3.3	12.0	-5.9	40
21	6	15	3.8	6.4	189	7.4	15.0	0.0	43
22	5	36	1.7	4.1	301	2.1	6.8	-2.0	69
23	5	24	1.0	1.9	59	0.3	7.3	-6.3	63
24	9	19	1.5	3.1	175	2.2	12.1	-5.3	52
25	7	21	2.4	5.1	179	3.9	11.3	-4.1	58
26	2	16	2.8	5.6	264	2.5	6.7	-1.8	57
27	3	25	2.2	3.7	228	4.4	12.4	-3.0	49
28	7	51	4.3	6.9	190	7.9	14.1	0.1	36
29	4	14	3.9	5.8	199	7.8	12.3	2.1	60
30	2	16	1.8	3.7	227	1.1	5.1	-3.0	72
31	1	15	1.7	3.1	246	-0.2	6.7	-4.7	61

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

APPENDIX B

DUST SAMPLE MEMORANDA

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MEMORANDUM – Opportunity / Warm Springs Ambient Dust Sampling Events

Sampling Period: January 1 – March 28, 2010 (Settled Dust and Dustfall)

Submitted by Steve Heck, Blacktail Consulting, Inc.

May 11, 2010

This memorandum describes the preliminary results of settled dust and dustfall sampling conducted at the Opportunity and Warm Springs air monitoring sites on behalf of Kuipers and Associates, and Anaconda-Deer Lodge County. All data, discussion and conclusions provided in this report are preliminary and will undergo a complete quality assurance review prior to issuance of final results in quarterly and annual reports in accordance with the project Sampling and Analysis Plan.

1. INTRODUCTION

Since the late summer of 2008, opportunistic settled dust and dustfall sampling has been conducted at the Opportunity and Warm Springs air monitoring sites to determine the trace metal content of airborne particulate that settles on outdoor surfaces. The settled dust samples have been collected by vacuuming settled particulate onto filter cassettes from clean glass dishes; after initial sample handling issues were resolved, these sampling events proceeded smoothly, with consistent analytical results.

The dustfall sampling was more problematic, for reasons that became apparent as sampling progressed:

- Initially, the entire contents of each dustfall jar (which included a large volume of liquid) were evaporated in a 2,000 ml glass beaker. The evaporated beakers were weighed on a 0.01-g resolution balance. This approach provided poor resolution, and consequently large uncertainty in particulate mass determinations.

- During the winter of 2008-2009, high-grade isopropyl alcohol was added to the dustfall jars in the field to prevent freezing. The alcohol was found to have minimal amounts of arsenic

and zinc. However, the large amount of alcohol used for each sample (due to rapid evaporation) introduced large uncertainties into the analytical results.

Both problems were resolved over the first few sampling episodes. However, another problem developed during the late spring: flying insects such as flies, gnats and bees – and occasionally airborne plant material –became trapped in the dustfall liquid, rendering reliable particulate mass determinations impossible. This problem continued through the summer and early fall, and samples collected during those seasons were not analyzed.

The second set of insect-free dustfall samples was collected over the period of January 1, 2010 to March 28, 2010. Settled particulate samples were also collected over the same period. This sampling episode is the second for which reliable comparisons can be made between dustfall and settled dust analytical results at the Opportunity and Warm Springs sites.

2. SAMPLE COLLECTION

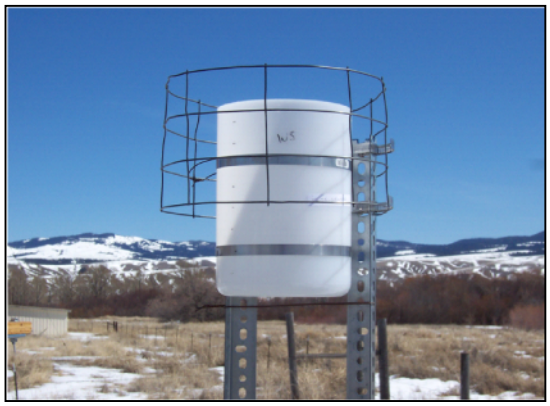
2.1 Settled Dust Samples

On January 1, 2010, four clean 9-inch diameter glass dishes were set out at both sites at a height of approximately 7 feet to capture and retain settling dust. A personal sampling pump supplied by SKC, Inc. was used to vacuum any settled dust from the dishes during twice-weekly site visits. Vacuuming could not be performed when standing water was present. In those instances, the water was either dumped or allowed to evaporate, and vacuuming was performed at the next opportunity.

The vacuumed dust was collected onto 37-mm diameter, matched weight mixed cellulose ester (MCE) filter cassettes. The filters were recommended by the manufacturer for applications involving trace element analyses. The matched filter weights allow one to avoid filter pre-weighing. The total dust determination is made by simply weighing the two filters following sampling; the difference in their weights equals the mass of dust collected.

The glass dishes were vacuumed for the last time on March 28, 2010, and the cassettes were submitted to the MSE Laboratory for analysis. Both samples were weighed to determine the total amount of particulate collected. Samples having a sufficient net dust mass (≥ 1.0 mg) were analyzed for arsenic, cadmium, copper, lead and zinc.

2.2 Dustfall Samples



On January 1, 2010, clean 6.75 inch diameter by 8.75 inch tall Nalgene (polypropylene) dustfall jars were installed at both sites at a height of approximately 8 feet to capture and retain settling dust. The jars were de-contaminated by the laboratory prior to use by cleaning them with laboratory soap, then rinsing them with nitric acid and deionized water. The jars were initially filled to a depth of 2 inches with deionized water (DI H_2O). The jars were inspected during twice-weekly site visits; DI H_2O was added as necessary to maintain a liquid level of at least an inch. At the end of the sampling period on March 28, 2010, the jars were covered with clean lids, and transported to the MSE laboratory for analysis. A Field Blank sample also was prepared by partially filling a clean dustfall jar with DI H_2O.

Additionally, a dry dustfall jar was installed at the Opportunity site, and no was water added during the sampling period. The purpose of that sample was to determine whether dry jars could be used during the insect season to obtain reasonable dustfall data. For reasons discussed in Section 6.2, those results are not being reported pending further investigation.

3. ANALYTICAL PROCEDURES

3.1 Settled Dust Samples

Following weighing, the filters and any particulate contents were digested using Method SW-846 3050B for soils, and analyzed for trace metals by ICP Mass Spectrometer (ICP-MS) using Method SW-846 6020A.

3.2 Dustfall Samples

After delivery to the laboratory, the dustfall jar contents were transferred into 2,000 mL beakers, which then were covered with watchglasses and evaporated in a convection oven at a temperature of 90 to 105ºC. After the liquid evaporated down to approximately 100-200 mL, the contents were transferred to pre-weighed 200-mL beakers and evaporated to dryness. The beakers then were weighed to within 0.0001 grams to determine a net particulate residue weight.

The residue was digested using SW-846 Method 3050B for soils, and analyzed for trace metals by ICP Mass Spectrometer ICP-MS using Method SW-846 6020A.

4. ANALYTICAL RESULTS

Table 1 presents analytical results for the settled dust results, while Table 2 presents results for the dustfall samples. Table 3 summarizes the results, including comparisons of those obtained from the settled dust versus dustfall sampling procedures. Important findings are summarized in Section 5, and recommendations for future sampling are made in Section 6.

4.1 Settled Dust Samples

4.1.1 Filter Weights

The filters were weighed on an enclosed balance with a resolution of 0.0001 grams (0.1 mg). Results are shown in Section A of Table 1. The "Tare" filter weight is the weight of the unexposed matched weight filter, and the "Exposed" weight is the weight of the filter dust was collected on. The net dust weight was calculated as the difference between these values.

The Opportunity sample contained 25.5 mg of dust, versus 38.0 mg for the Warm Springs sample. Both dust masses were sufficient for trace element analyses.

4.1.2 Trace Element Results

The trace element results are presented in Section B of Table 1. The "Total" results represent the trace element concentrations in the exposed filter – which includes contributions from both the filter material and the collected dust. Field Blank results are shown in the column labeled "Blank," and were consistent with previous data. The "Net" filter trace element concentrations were calculated by subtracting the blank values from the total values, and represent the average trace element concentrations throughout the filter based solely on the contribution from the collected dust.

4.1.3 Trace Element Concentrations in Dust

The net trace element concentrations in Section B are for the entire exposed filter mass. Trace element concentrations in the collected dust were calculated using the net trace element results, the exposed filter weight and the collected dust weight. For the Opportunity sample, the net dust weight was 0.0255 grams, while the total weight of the exposed MCE filter was 0.0720 grams. The following example illustrates the calculation used to determine trace element concentrations in the collected dust:

- Concentration of arsenic over the entire exposed filter was 18.9 mg/kg. Therefore, the amount of arsenic present was 18.9 mg/kg x 0.0720 g, or 1.361×10^{-3} mg.
- Because all of this net arsenic concentration was contained in the dust portion, the arsenic concentration in dust was 1.361×10^{-3} mg / 0.0255 g, or 53.4 mg/kg.

The concentrations of other trace elements in the dust were calculated in the same manner. Results are summarized in Section C.

Disassembly and weighing of the filter cassettes proceeded smoothly for these samples, and no analytical issues were encountered.

4.2 Dustfall Samples

4.2.1 Trace Element Results

The raw trace element results are presented in Part A of Table 2. They show the trace element concentrations in the liquid as received by the laboratory, the volume of liquid initially evaporated, and the net weight of solids after evaporation.

The total trace element masses in each sample were calculated by multiplying the concentrations in the sample liquid by the volume of liquid as received by the laboratory. Those results are shown in Part B of Table 2.

4.2.2 Trace Element Concentrations in Dustfall Particulate

The trace element concentrations in the collected particulate were calculated by dividing the trace element masses by the total amount of particulate collected in each sample. Results are shown in Part C of Table 2.

4.2.3 Field Blank Results

Field Blank results for this sampling event are shown in Part A of Table 2. Additionally, the MSE Laboratory prepared a laboratory blank that was carried through the evaporation and analysis process. Trace levels of the COCs were reported from the Field Blank sample, but levels for arsenic, copper, lead and zinc were very low in comparison to the dustfall samples. The cadmium levels were very low for both the dustfall and Field Blank samples.

4.2.4 Calculation of Total Dustfall Rate

Dustfall is expressed in units of g/m^2/month, and is calculated by dividing the mass of particulate collected by the cross-sectional area of the dustfall jar, and adjusting that result to account for the number of days the sample was actually collected over. With a diameter of 6.75 inches, the dustfall jars have a cross-sectional area of 35.78 in^2, or 0.0231 m^2. The calculated dustfall rates were as follows:

Sampling Period	Opportunity		Warm Springs	
	g/m^2	g/m^2/month (1)	g/m^2	g/m^2/month (1)
1/1/2010 – 3/28/2010	0.45	0.16	0.55	0.19
(1) Dustfall rate based on 30-day month.				

The values for the both samples are below the method's stated detection limit of 0.2 g/m^2/month. The Montana settleable particulate (dustfall) standard is 10 g/m^2/month.

5. SUMMARY

Table 3 compares the settled dust and dustfall results for both sites. Overall, results obtained from the two methods were fairly consistent.

5.1 Opportunity Site

At the Opportunity site, results for arsenic, cadmium, copper and lead were very similar for both methods. However, the zinc concentration for the dustfall sample was over twice that for the settled dust sample. Both the arsenic and lead results were somewhat lower than what was observed in prior sampling events, but still of the same magnitude.

Selected exposed filters from the ARCO South samplers at Opportunity are analyzed for arsenic and lead concentrations, in addition to PM10. Average concentrations of arsenic and lead for the ARCO samples were calculated for the first nine months of calendar year 2009 on a total mass basis. Using only those samples with a PM10 concentration of at least 10 $\mu g/m^3$, a result of 108 mg/kg was obtained for arsenic, and 220 mg/kg for lead. Although the sampling methods and time intervals are much different, and the ARCO samplers collect only PM10 (rather than total particulate), the arsenic and lead concentrations found in the settled dust and dustfall samples were qualitatively similar to those calculated for the ARCO air samples.

5.2 Warm Springs Site

At the Warm Springs site, results for copper and lead were fairly similar for both methods. However, the arsenic, cadmium and zinc concentrations for the dustfall sample were noticeably higher than for the settled dust sample.

Both the arsenic and lead results were similar to what was observed in prior sampling events. The trace element concentrations for the settled dust sample were very similar to those for the Opportunity site.

6. RECOMMENDATIONS FOR FUTURE SAMPLING

6.1 Settled Dust Sampling

The settled dust sampling is providing consistent, reliable results, and will continue to be performed in the current manner. A set of duplicate settled dust samples will be collected at the Opportunity site during the summer of 2010, when ambient particulate levels are typically at their highest.

6.2 Dustfall Sampling

Since isopropyl alcohol is no longer being used in the dustfall jars, the sample collection cost is minimal. Therefore, dustfall samples will continue to be collected at both sites concurrent with the settled dust sampling events. Dustfall samples will be submitted for analysis only if they are free of insect and plant material that could compromise dust mass determinations.

It is believed that the presence of water in the dustfall jars attracts insects, which can subsequently become trapped. For the Opportunity sampling event discussed herein, one jar was prepared in the normal manner, while a second was installed with no water ("dry"). Results for the two jars indicated virtually identical dust retention, but the trace element results for the dry jar differed greatly from the normal jar, and so are not being reported pending further investigation. Dustfall jars prepared in the same manner for the period of March 28 – April 26, 2010 are currently being analyzed by the laboratory. Results for that set will be evaluated to determine whether discrepancies in the current analytical results can be attributed to differences in sample collection methodology, or to a potential contamination issue.

TABLE 1 - OPPORTUNITY / WARM SPRINGS SETTLED DUST SAMPLE RESULTS
(Sampling conducted 1-1-2010 through 3-28-2010)

A. Filter Weight Data

Opportunity Analyzed Filter Weight (g)	0.0720
Opportunity Tare Filter Weight (g)	0.0465
Opportunity Net Particulate Weight (g)	0.0255
Warm Springs Analyzed Filter Weight (g)	0.0889
Warm Springs Tare Filter Weight (g)	0.0509
Warm Springs Weight (g)	0.0380

B. Trace Element Results

	Opportunity			*Warm Springs*			*Blank* (1)
Analyte	Total Filter Conc. (mg/kg)	Net Filter Conc. (mg/kg)	Reporting Limit (mg/kg)	Total Filter Conc. (mg/kg)	Net Filter Conc. (mg/kg)	Reporting Limit (mg/kg)	Conc. (mg/kg)
As	18.9	18.9	1.04	25.8	25.8	0.844	ND
Cd	0.967	0.967	0.069	1.41	1.41	0.056	ND
Cu	98.3	97.5	0.868	127	126	0.703	0.799
Pb	28.3	28.1	0.139	59.4	59.2	0.112	0.159
Zn	208	188	2.08	240	220	1.69	20.0

(1) Unexposed clean filter

C. Calculated Trace Element Concentrations in Particulate

	Opportunity			*Warm Springs*		
Analyte	Net Filter Conc. (mg/kg)	***Net Particulate Conc. (mg/kg)***	(1) Reporting Limit (mg/kg)	Net Filter Conc. (mg/kg)	***Net Particulate Conc. (mg/kg)***	(1) Reporting Limit (mg/kg)
As	18.9	***53.4***	2.94	25.8	***60.4***	1.97
Cd	0.967	***2.73***	0.195	1.41	***3.30***	0.131
Cu	97.5	***275***	2.45	126	***295***	1.64
Pb	28.1	***79.5***	0.392	59.2	***139***	0.262
Zn	188	***531***	5.87	220	***515***	3.95

(1) Reporting Limit adjusted to reflect mass of particulate collected

TABLE 2 -- SUMMARY OF OPPORTUNITY / WARM SPRINGS DUSTFALL RESULTS
(Samples collected from 1-1-2010 to 3-28-2010)

A. Analytical Results

Analyte	Opportunity (ug/L)	Warm Springs (ug/L)	Field Blank (ug/L)
As	1.04	1.68	0.075
Cd	0.056	0.150	0.145
Cu	4.61	4.93	0.393
Pb	1.36	2.53	0.075
Zn	20.3	17.1	1.88
Sample Volume (mL)	600	658	900
Solids Weight (mg)	10.4	12.7	2.0
Solids (mg/L)	17.3	19.3	2.2 (<MDL)
ND = Not Detected; NA = Not Applicable			

B. Trace Element Weight

Analyte	Opportunity Total (ug)	Warm Springs Total (ug)
As	0.624	1.11
Cd	0.034	0.099
Cu	2.77	3.24
Pb	0.816	1.66
Zn	12.2	11.3

C. Trace Element Concentrations in Particulate

Analyte	Opportunity mg/kg	Reporting Limit mg/kg	Warm Springs mg/kg	Reporting Limit mg/kg
As	**60.0**	7.21	**87.0**	5.91
Cd	**3.23**	0.481	**7.77**	0.394
Cu	**266**	6.01	**255**	4.92
Pb	**78.5**	0.962	**131**	0.787
Zn	**1171**	14.4	**886**	11.8

TABLE 3 – SUMMARY OF SETTLED DUST / DUSTFALL SAMPLING RESULTS

Analyte (mg/kg)	Opportunity		Warm Springs	
	Settled Dust	Dustfall	Settled Dust	Dustfall
As	53.4	60.0	60.4	87.0
Cd	2.73	3.23	3.30	7.77
Cu	275	266	295	255
Pb	79.5	78.5	139	131
Zn	531	1171	515	886
Dustfall Rate (g/m^2/month) (1)	N/A	0.16	N/A	0.19
(1) Based on 30-day month				

APPENDIX C

E-BAM PERFORMANCE CHECK / MAINTENANCE PROCEDURES FIRST QUARTER 2010

1.1 Performance Check / Maintenance Procedures

1.1.1 E-BAM Sampler

Several checks are performed on the E-BAM sampler, including both its particulate monitoring system and the internal barometric pressure sensor.

1.1.1.1 Leak Check (E-BAM Manual Section 2.4.1.1)

Each month, the E-BAM sampler is checked for leaks in the sampling train that could compromise data integrity. This check is performed by installing a BX-302 valve/filter assembly in place of the sampling inlet, and running the sampler in its "pump test" mode while slowly closing the valve. The check is considered satisfactory if the flow drops to below 1.5 LPM.

1.1.1.2 Operating Flow Rate Check (E-BAM Manual Section 2.4.1.5)

The operating flow rate check is performed monthly by installing an NIST-traceable BGI Delta-Cal flow monitor in place of the sampling inlet, and comparing the indicated flow against the target of 16.7 LPM. The check is considered satisfactory if the indicated flow is within +/- 2% of the target value. Otherwise, the flow is adjusted at set points of 14.0 LPM and 17.5 LPM, and the operating flow re-checked.

A successful operating flow rate check, when preceded by a successful leak check, proves that the E-BAM sampler is collecting valid PM_{10} data.

1.1.1.3 Pump Test (E-BAM Manual Section 2.4.1.7)

This test was discontinued during the third quarter of 2009, because experience has shown it to be of little value for indicating when a pump is nearing the end of its operating life.

1.1.1.4 Zero/Span Check (E-BAM Manual Section 2.4.3.1)

Zero and span membrane plates supplied with each sampler are used quarterly to check the calibration of the E-BAM sampler's beta attenuation detector (The manual indicates this check is not required until after 6 months of operation). These plates simulate specific particulate loads when used in conjunction with a blank filter tape. The checks are performed within the E-BAM sampler's "membrane test" menu, which directs the user to install and remove the plates at specified times. At the conclusion of the test, the display screen indicates whether the calibration test was successful. The membrane plates are certified by the manufacturer.

1.1.1.5 Clean Valve and Nozzle (E-BAM Manual Section 2.4.5)

The sampler's sample inlet nozzle (located directly above the filter tape) and vane (located directly beneath the filter tape) are cleaned monthly with a modified Q-tip using isopropyl alcohol. Care is taken that no excess alcohol drips into the vane assembly, which could affect

the unit's calibration. Immediately after performing this maintenance, the leak check described in Section 1.1.1.1 is repeated to ensure that the sample train integrity was not compromised.

1.1.1.6 Clean PM_{10} Inlet (E-BAM Manual Appendix H)

Each month the PM_{10} inlet is removed from the sampler, disassembled and cleaned using paper towels and isopropyl alcohol. Additionally, all o-rings are lubricated with stopcock grease as necessary.

1.1.1.7 Barometric Pressure Sensor Check (E-BAM Manual Section 2.4.1.4)

The E-BAM's internal barometer is checked monthly using a Wallace and Tiernan aneroid barometer that is routinely checked against a mercury wall barometer. If the results agree within +/- 2 mmHg, no adjustment is necessary.

1.1.2 Meteorological Sensors

1.1.2.1 Temperature (E-BAM Manual Section 2.4.1.3)

The E-BAM manual specifies a two-point calibration procedure using an ambient temperature and an ice bath. However, the manufacturer indicated that a single-point field calibration check was generally sufficient. Disassembly of the sensor for placement in an ice bath is not trivial, and is impractical as a routine field activity.

The temperature sensor is checked monthly at ambient conditions using an Assmann Psychrometer that has been certified against an NIST-traceable mercury thermometer. If the readings agree to within 0.5 degrees Celsius, no adjustment is necessary.

1.1.2.2 Relative Humidity (Model 593 Relative Humidity Sensor Operation Manual)

The Model 593 Manual indicates that recalibration (requiring additional specialized equipment) is required only if the sensor element is replaced in the field. For this project, calibration of the relative humidity sensor will be limited to monthly collocated checks using an Assmann Psychrometer that is certified against an NIST-traceable mercury thermometer. Wet-bulb and dry-bulb temperatures, together with ambient barometric pressure, are used with psychrometric tables to calculate a true relative humidity, which is compared against the E-BAM display. If the indicated relative humidity agrees with that obtained by the Assmann psychrometer to within +/- 5% relative humidity, the results are considered acceptable. If consistently unacceptable results are obtained, the relative humidity sensor will be returned to the manufacturer for re-calibration and/or repair.

1.1.2.3 Wind Speed (Model 034B Wind Sensor Operation Manual)

The Model 034B Manual recommends an initial check of the unit's response to a known rotation rate. This is being done monthly in the field using a 300 rpm synchronous motor to produce a known wind speed of 18.49 mph (8.27 m/s). The manual specifies an accuracy of +/- 0.25 mph

(0.11 m/s) at speeds below 22.7 mph (10.1 m/s). Additionally, the response of the sensor when stopped is observed; it should be 0.3 +/- 0.1 m/s.

1.1.2.4 Wind Direction (Model 034B Wind Sensor Operation Manual)

The manual does not specify routine checks for the wind direction sensor, beyond an initial check to confirm that the sensor's readout increases from 0 to 360 degrees as the shaft is turned clockwise. However, routine checks are performed monthly to verify proper operation. First, the sensor's alignment is verified by locking the sensor in place with its alignment pin, and ensuring that a response of between 178 and 182 degrees is obtained. Next, the sensor's linearity is verified by turning it in 90-degree intervals (using the sensor crossarm as a visual reference), and confirming that the E-BAM display's direction indication changes by 90 +/- 3 degrees with each step.

The initial orientation of the sensor was performed using a solar sighting in conjunction with NIST time (WWV) to establish precise direction azimuths. The use of solar sightings – rather than magnetic compass readings – negates any localized magnetic influences.

1.1.2.5 Filter Temperature and Humidity (E-BAM Manual Sections 2.4.2.1 and 2.4.2.2)

The E-BAM Manual includes provisions for adjusting the response of both of these parameters. However, there is no practical way to accurately check either parameter with an external reference standard. Therefore, checks of these parameters will be limited to review of downloaded data files for suspicious behavior.

1.2 Performance Check Results

Each set of performance check results is presented in Appendix D. Results obtained during the first quarter of 2010 were satisfactory

APPENDIX D

E-BAM PERFORMANCE CHECK RESULTS

OPPORTUNITY SITE

	DATE	1/13/2010	2/21/2010	3/28/2010
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1514 MST	1650 MST	1403 MST
	EBAM BACK ON-LINE@	1555 MST	1719 MST	1455 MST
	Reason	Monthly checks	Monthly checks	Monthly checks
	Comments	A	B	
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	2.6	4.6	13.2
	Audit	2.6	5.0	12.9
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	53%	39%	15%
	Audit (Td/Tw)	2.6 / -0.8	5.0 / -0.1	12.9 / 2.9
	Audit RH	53.0%	37.5%	13.2%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped	0.3	0.3	0.3
	EBAM-Spinning	0.7	1.5	3.2
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated	8.3	8.3	8.3
	Known	8.27	8.27	8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	632.0	633.3	633.5
	Audit	631	633	633
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	180	179-180	180
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm	155	155	155
	+90 degrees	246	244	244
	+180 degrees	336	335	336
	+270 degrees	66	66	66
	+360 degrees	154	155	155
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	0.8 LPM	0.9 LPM	0.8 LPM
	Leak repaired?	NA	NA	NA
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.67	16.66	16.79
	As left (if recalibrated)	NA	NA	NA
Flow Calibration - Low Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Flow Calibration - High Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Clean Nozzle (see 2.4.5)	Confirm (X)	X	X	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)	NA	NA	NA
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	0.341 (Pass)	NA	NA
	Span Pass/Fail	0.940 (Pass)	NA	NA
Confirm Leak Check (after maintenance)	Result	0.9 LPM	0.9 LPM	0.8 LPM
	Leak repaired?	NA	NA	NA

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

A = Temperature & humidity checked on 2-1-2010.
B = Temperature & humidity checked on 2-26-2010.

WARM SPRINGS SITE

	DATE	1/13/2010	2/21/2010	3/27/2010
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1404 MST	1505 MST	1118 MST
	EBAM BACK ON-LINE@	1455 MST	1555 MST	1158 MST
	Reason	Monthly checks	Monthly checks	Monthly checks
	Comments	A	B	
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	3.6	3.8	13.3
	Audit	3.3	4.1	13.1
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	57%	43%	12%
	Audit (Td/Tw)	3.3 / 0.0	4.1 / -0.5	13.1 / 2.8
	Audit RH	55.5%	41.0%	11.9%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped	0.3	0.3	0.3
	EBAM-Spinning	0.8	2.3	8.0
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated	8.3	8.3	8.3
	Known	8.27	8.27	8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	634.1	635.8	637.4
	Audit	634	635	637
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	179	178-179	179
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm	190	189	190
	+90 degrees	282	280	281
	+180 degrees	10	12	10
	+270 degrees	102	99	103
	+360 degrees	189	190	189
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	0.5 LPM	0.5 LPM	0.5 LPM
	Leak repaired?	NA	NA	NA
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.51	16.60	16.56
	As left (if recalibrated)	NA	NA	NA
Flow Calibration - Low Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Flow Calibration - High Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Clean Nozzle (see 2.4.5)	Confirm (X)	X	X	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)	X	X	X
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	0.371 (Pass)	NA	NA
	Span Pass/Fail	0.960 (Pass)	NA	NA
Confirm Leak Check (after maintenance)	Result	0.5 LPM	0.5 LPM	0.5 LPM
	Leak repaired?	NA	NA	NA

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

A = Temperature & humidity checked on 2-1-2010
B = Temperature & humidity checked on 2-26-2010

APPENDIX E

AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES
FIRST QUARTER 2010

Opportunity Site January 2010 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	10	10	-3	6	-4	-1	8	1	3	2	2	6	-2	4	9	11	3	-3	23	-5	6	1	13	-5	24	4.0
2	30	-5	-1	-2	4	-5	-3	9	-5	12	-2	2	-4	-3	0	1	1	1	2	-2	3	8	-5	0	24	1.5
3	8	17	-4	-1	-5	6	-5	9	1	6	1	1	-2	1	0	0	15	7	-5	3	2	8	6	-5	24	2.7
4	-4	-1	-5	11	-2	18	-5	0	10	7	23	2	4	2	10	9	5	7	1	-1	13	-5	2	3	24	4.3
5	-4	0	34	-5	3	-5	8	0	3	-5	19	-5	-3	-3	13	-5	3	4	1	136	-5	AM	AM	AM	21	8.8
6	AM	16	26	15	10	11	5	4	-3	24	-4	2	4	15	-1	10	18	21	30	17	13	32	14	-2	23	12.0
7	15	13	AO	AO	AO	AO	AO	AO	12	8	18	3	8	9	14	17	13	40	36	24	31	25	7	5	18	16.6
8	37	9	23	33	28	-5	-3	38	13	17	8	6	12	15	23	14	17	-5	10	38	30	24	28	63	24	19.7
9	25	27	35	22	28	42	2	16	23	22	17	15	24	7	21	25	25	21	41	1	46	-3	28	38	24	22.8
10	38	21	33	17	5	29	20	20	-5	27	-3	-2	18	7	20	30	6	8	16	11	2	-5	-2	-2	24	12.9
11	-1	11	-5	-3	5	0	4	4	12	5	7	23	10	1	15	6	5	2	0	7	-5	1	7	6	24	4.9
12	-2	11	-5	7	-5	3	2	2	-1	-1	-2	14	20	-5	1	3	5	9	8	-2	-4	0	4	0	24	2.6
13	-5	8	0	10	-3	-5	16	-5	15	-5	2	5	6	-2	24	BA	28	18	26	34	26	23	43	58	23	13.8
14	0	13	7	-1	16	14	45	7	41	4	2	4	1	13	-5	10	1	0	1	4	6	14	-5	-4	24	7.8
15	-1	-3	7	0	4	2	6	0	7	8	3	5	3	12	11	17	16	-2	-3	6	19	15	4	18	24	6.4
16	-4	2	8	4	2	4	2	3	10	4	4	2	12	-3	8	6	6	-5	10	5	5	2	8	2	24	4.0
17	3	-5	10	18	-5	8	2	-4	2	9	8	-4	8	1	33	-5	5	3	6	6	7	5	12	6	24	5.4
18	3	1	-1	7	0	2	0	2	5	11	20	3	11	5	-1	5	12	1	5	24	-5	1	-4	7	24	4.8
19	-5	6	-1	1	-2	4	1	6	-5	12	2	-1	2	8	6	-3	1	6	6	10	2	-1	-3	-1	24	2.1
20	7	-4	3	1	-2	11	-3	1	8	0	16	10	6	8	11	0	5	7	11	6	1	32	6	2	24	6.0
21	10	5	-4	0	17	-1	8	5	-4	7	-2	6	-1	7	14	0	3	11	11	5	19	8	-5	-5	24	4.8
22	12	15	22	10	-5	4	5	1	24	4	14	41	-5	5	5	-5	8	44	-5	2	17	2	5	7	24	9.5
23	1	6	0	2	-2	6	-3	6	12	5	28	2	3	16	-1	7	1	10	11	-5	35	6	10	17	24	7.2
24	42	-3	12	26	39	14	2	2	8	22	6	14	2	11	9	15	4	7	2	9	14	15	20	37	24	13.7
25	-5	12	11	11	6	-2	5	22	-5	8	2	-2	3	1	3	6	21	6	8	-5	15	4	-1	21	24	6.0
26	-2	12	16	19	0	18	13	8	-5	0	14	18	-5	20	-5	18	-5	-3	6	2	11	22	-5	5	24	7.2
27	3	11	6	13	9	18	0	15	9	16	24	16	13	7	10	10	-1	-5	31	27	15	-5	35	18	24	12.3
28	-2	36	-5	9	13	0	17	-4	29	5	6	14	10	15	15	8	14	-4	24	32	28	20	-5	4	24	11.6
29	20	-5	20	14	-2	19	10	25	31	2	0	19	14	10	15	17	15	12	22	23	37	-5	58	10	24	15.9
30	32	0	10	29	-5	12	29	8	-3	17	18	5	-1	11	8	10	11	2	32	27	27	8	43	-5	24	13.5
31	32	23	26	-5	34	30	20	16	24	5	2	18	6	15	17	0	15	2	21	4	13	15	22	27	24	15.9
NO.	30	31	30	30	30	30	30	30	31	31	31	31	31	31	31	30	31	31	31	31	31	30	30	30		
MAX.	42	36	35	33	39	42	45	38	41	27	28	41	24	20	33	30	28	44	41	136	46	32	58	63		
AVG.	10	8	9	9	6	8	7	7	9	8	8	8	6	7	10	8	9	7	13	14	14	9	11	11		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Opportunity Site February 2010 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-2	25	4	-5	21	-2	10	10	37	13	12	9	0	4	1	0	-1	5	-5	32	-5	12	10	4	24	7.9
2	6	5	-5	1	-1	-5	3	5	1	-4	-1	2	3	-1	4	8	4	5	1	1	24	34	-5	32	24	4.9
3	-5	18	0	33	-5	-5	16	5	20	4	23	28	8	7	26	14	9	2	1	18	34	7	29	17	24	12.7
4	25	-2	-5	47	16	-3	24	-5	39	23	18	25	4	14	16	17	18	19	5	3	28	19	37	6	24	16.2
5	7	13	4	9	10	5	10	-5	5	1	12	1	0	8	-4	6	0	10	2	24	-3	20	-5	7	24	5.7
6	4	16	15	27	16	20	32	7	19	28	-5	5	-1	-2	12	1	3	11	-5	19	-1	22	-5	-1	24	9.9
7	20	7	14	-5	17	27	-5	20	19	-3	-2	14	3	2	3	15	1	-5	8	26	9	12	6	1	24	8.5
8	2	23	1	16	13	8	16	11	24	0	22	7	-5	8	-1	20	9	-5	7	11	14	14	20	-5	24	9.6
9	11	39	2	12	30	0	-5	9	9	28	-5	33	7	46	33	8	4	8	5	16	-5	17	11	-1	24	13.0
10	2	19	-5	-2	3	-3	9	2	-1	-4	17	-3	6	-2	-2	0	12	-5	9	4	5	-4	-1	-1	24	2.3
11	4	-2	-1	-2	11	6	5	14	9	6	7	30	30	0	12	0	0	9	2	-1	3	2	-3	5	24	6.1
12	-4	-1	4	-5	-5	15	5	0	1	-3	-5	1	-1	-2	6	1	1	4	0	0	3	-5	2	-5	24	0.3
13	12	-5	2	7	-5	0	10	-5	31	-5	-5	-5	4	1	-1	6	-1	2	4	7	-5	16	14	11	24	3.8
14	9	3	-5	7	3	-5	10	4	7	8	-3	5	1	7	0	12	-5	0	1	8	-1	15	0	39	24	5.0
15	4	15	7	-1	10	11	7	26	11	12	9	9	-1	3	3	3	6	-2	6	15	0	15	3	7	24	7.4
16	-2	-5	15	3	5	-5	6	3	17	13	7	3	13	-2	18	1	13	6	2	23	10	33	16	11	24	8.5
17	8	22	9	-5	33	10	12	-5	15	13	-5	-5	7	11	7	27	26	2	5	5	8	16	17	2	24	9.8
18	13	5	-5	3	-5	6	15	12	14	8	4	12	-1	2	6	21	-4	3	6	6	-2	10	9	19	24	6.5
19	-5	-5	23	-5	5	22	-5	13	12	-5	4	-1	4	7	-5	7	1	3	1	-5	13	6	4	49	24	5.8
20	11	3	25	10	14	1	15	10	15	8	12	5	7	5	-1	6	2	6	12	7	4	-5	27	17	24	9.0
21	27	15	27	4	-1	25	7	20	22	5	2	6	6	3	10	6	BA	BA	8	7	6	14	-5	9	22	10.1
22	15	7	18	7	-5	24	18	4	10	16	26	8	6	12	6	8	9	12	14	20	28	22	22	7	24	13.1
23	15	3	14	4	9	-1	19	14	7	22	53	50	3	1	10	5	6	10	12	9	12	10	15	7	24	12.9
24	6	7	7	15	50	8	20	-5	36	12	9	7	6	3	25	-5	5	-5	2	3	1	-5	-1	-2	24	8.3
25	7	25	-2	7	7	3	0	16	-3	1	-3	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	11	5.3
26	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	8	5	8	4	7	7	6	6.5
27	-2	8	3	6	5	1	2	4	4	9	-5	2	-1	8	3	10	1	9	5	8	15	3	21	10	24	5.4
28	24	27	-5	23	-5	14	11	4	25	3	8	13	-1	2	7	1	4	3	6	2	-5	28	-5	-3	24	7.5
NO.	27	27	27	27	27	27	27	27	27	27	27	26	26	26	26	26	25	25	27	27	27	27	27	27		
MAX.	27	39	27	47	50	27	32	26	39	28	53	50	30	46	33	27	26	19	14	32	34	34	37	49		
AVG.	8	11	6	8	9	7	10	7	15	8	8	10	4	6	7	8	5	4	5	10	7	12	9	9		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Opportunity Site March 2010 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	12	14	-3	5	12	-5	15	4	6	8	8	11	5	4	-3	10	1	16	12	5	21	14	19	12	24	8.5
2	-4	-2	9	3	-3	3	7	18	33	26	11	12	7	5	1	14	14	14	6	6	2	12	9	2	24	8.5
3	10	12	-5	3	8	-1	8	2	30	3	0	2	7	4	3	2	4	10	2	-5	8	9	3	5	24	5.2
4	8	11	18	-5	18	21	11	-5	10	25	8	1	7	-3	1	7	6	-2	5	-5	29	3	17	7	24	8.0
5	45	34	19	30	13	9	23	0	23	5	-3	1	6	1	4	7	5	7	6	26	-2	23	3	20	24	12.7
6	28	0	19	-5	16	14	3	13	4	1	-1	8	3	5	5	11	1	10	10	21	14	16	4	0	24	8.3
7	13	13	2	13	15	1	14	11	7	10	5	3	5	11	8	6	6	3	9	20	12	13	17	10	24	9.5
8	4	1	16	9	4	5	7	14	7	3	20	11	7	7	12	10	0	17	0	14	15	24	-5	-5	24	8.2
9	9	-5	8	-3	10	12	1	10	13	14	6	11	3	10	13	-5	2	12	4	6	-2	6	-1	7	24	5.9
10	-5	5	-5	4	2	2	-5	2	7	1	2	1	6	-2	2	6	2	5	1	7	8	5	-3	7	24	2.3
11	-2	-5	15	-5	5	0	-3	20	-1	6	5	1	0	3	2	7	-5	6	0	0	6	2	5	0	24	2.6
12	5	5	2	-1	16	1	11	18	8	15	23	31	22	15	33	30	10	20	-1	11	9	13	12	-1	24	12.8
13	8	7	2	7	1	10	-4	16	5	20	6	-3	6	3	-1	4	-1	4	4	-2	0	-5	3	-4	24	3.6
14	14	-5	9	-5	3	4	-3	8	-2	2	7	2	4	3	-5	16	3	BA	9	0	10	10	-1	5	23	3.8
15	0	8	5	-2	1	-3	8	-3	32	12	27	2	11	11	7	5	13	4	12	31	18	12	22	7	24	10.0
16	4	4	6	5	1	2	5	0	3	26	20	12	7	12	28	13	6	1	13	-1	6	6	10	1	24	7.9
17	0	2	7	7	1	0	11	4	9	14	15	18	15	16	22	28	25	29	9	7	10	2	10	2	24	11.0
18	11	6	12	3	3	5	12	0	15	14	2	3	11	11	9	12	3	0	5	27	28	AM	34	-5	23	9.6
19	AN	1	16	3	-5	14	-5	15	0	-2	6	1	6	-1	7	-2	-1	-2	3	9	14	4	8	7	23	4.2
20	-1	6	3	1	9	-3	-4	9	1	5	10	6	8	5	9	5	4	13	7	8	16	10	10	0	24	5.7
21	7	9	8	0	9	5	-1	9	9	10	23	27	25	43	33	36	39	34	16	-5	8	-4	21	0	24	15.0
22	4	-5	15	-5	0	4	11	-4	4	1	15	-5	14	8	17	12	6	7	5	6	5	8	1	-5	24	5.0
23	-5	15	-5	1	10	3	6	10	-1	3	-4	8	-2	10	14	3	4	-2	3	8	9	13	14	17	24	5.5
24	15	-2	8	8	4	-1	17	10	6	21	17	13	13	11	22	34	16	26	26	23	36	57	20	25	24	17.7
25	13	12	6	8	9	8	11	9	44	19	10	8	66	314	27	27	31	10	10	-5	21	-5	16	5	24	28.1
26	-5	-1	11	9	-5	9	7	-5	0	0	20	2	29	11	8	31	26	-3	1	1	0	6	-1	-1	24	6.3
27	3	3	2	-5	0	-1	6	-3	-1	10	2	4	28	13	5	8	9	8	6	10	12	4	6	9	24	5.8
28	0	1	9	8	16	6	4	5	25	29	22	71	70	39	BA	38	110	30	19	16	10	26	31	14	23	26.0
29	1	12	9	24	25	48	35	32	17	22	22	9	-4	17	0	22	-2	-2	6	7	-5	4	12	-5	24	12.8
30	2	-4	-2	9	0	-3	5	11	7	4	-5	-5	14	2	4	2	5	8	0	0	4	14	20	14	24	4.4
31	13	-3	-2	5	-4	-3	0	2	-2	3	0	-5	8	-5	5	-3	8	1	-5	3	11	-3	10	4	24	1.6
NO.	30	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	30	31	31	31	30	31	31		
MAX.	45	34	19	30	25	48	35	32	44	29	27	71	70	314	33	38	110	34	26	31	36	57	34	25		
AVG.	7	5	7	4	6	5	7	7	10	11	10	8	13	19	10	13	11	9	7	8	11	10	11	5		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Warm Springs Site January 2010 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	8	-5	1	-3	-1	-5	-1	1	-2	2	-4	-2	3	-1	9	0	-2	-5	-5	23	-5	-1	17	-5	24	0.7
2	1	10	-2	1	2	-5	-5	5	4	0	3	-5	-2	7	3	2	-5	-5	1	-5	-3	6	-5	9	24	0.5
3	-5	-5	0	4	0	6	-3	3	8	3	1	0	0	5	-5	5	-5	10	6	1	5	3	3	0	24	1.7
4	-3	8	-2	3	17	11	-5	4	0	13	5	3	2	5	1	11	-1	7	-5	3	16	1	-1	3	24	4.0
5	0	-5	-1	4	3	4	10	-5	-5	15	-3	13	8	-5	3	1	2	15	-4	21	16	12	AM	AM	22	4.5
6	AM	13	23	12	11	11	1	1	-5	17	-2	-2	7	0	-2	12	16	6	8	1	AO	26	5	AO	21	7.6
7	AO	AO	AO	AO	AO	AO	AO	AO	AO	AO	3	12	5	15	16	16	26	13	19	25	19	AO	AO	22	12	15.9
8	22	AO	15	AO	AO	6	38	18	18	9	16	9	17	14	23	21	27	21	1	48	29	25	34	31	21	21.0
9	33	19	37	36	29	23	16	30	26	20	20	7	20	31	14	24	22	21	19	20	18	11	15	13	24	21.8
10	20	0	37	36	-2	32	12	0	10	10	33	-4	17	19	19	17	18	12	-5	26	15	15	-2	11	24	14.4
11	22	13	10	11	20	1	2	10	18	-5	11	7	-5	1	2	2	-3	-5	4	1	1	1	-1	5	24	5.1
12	-2	-1	0	1	4	5	1	-2	5	-4	-2	8	3	1	0	1	6	-5	4	4	3	6	-3	-5	24	1.2
13	3	9	5	-2	4	-5	10	-5	9	-5	3	12	-1	-4	BA	1	12	16	21	30	33	29	24	13	23	9.2
14	0	1	10	1	7	-5	-1	28	25	-1	-1	3	4	2	-5	-2	-1	2	-1	-1	0	4	3	0	24	3.0
15	2	1	1	5	6	-5	-2	4	-1	2	5	9	1	2	4	5	6	5	0	6	3	2	2	2	24	2.7
16	-1	3	2	-3	9	5	2	-2	0	4	0	7	-5	5	6	10	-1	0	8	2	-2	7	1	8	24	2.7
17	0	-5	21	9	-5	-1	10	0	1	-3	21	-5	4	-1	3	1	6	2	-4	1	-2	7	2	2	24	2.7
18	2	1	1	8	-5	8	-1	5	1	4	3	-3	12	-5	6	0	-5	-2	0	0	-2	5	6	-2	24	1.5
19	6	-1	0	1	9	4	1	1	0	1	6	-5	1	4	3	-5	7	2	-1	13	4	-5	0	2	24	2.0
20	-3	6	2	2	-3	10	-1	-5	0	-1	3	2	4	-1	3	-1	12	-5	1	-5	6	-2	1	4	24	1.2
21	3	-4	5	-4	2	-5	5	-5	25	-5	6	-5	10	-1	-3	-5	14	-1	-5	8	-5	-1	23	1	24	2.2
22	1	-1	8	9	4	-5	-5	-2	10	11	8	12	-3	7	4	0	7	14	5	19	1	11	-5	3	24	4.7
23	2	3	-3	10	8	3	-5	8	-4	7	9	-5	5	7	6	6	12	-2	9	12	5	-5	26	-5	24	4.5
24	21	4	11	22	6	3	3	-3	4	35	-5	15	5	2	16	0	9	13	2	22	-1	-5	7	20	24	8.6
25	18	-5	16	-5	14	1	2	5	12	21	-5	2	7	12	12	14	7	19	1	19	6	13	-5	4	24	7.7
26	13	22	13	11	18	15	10	5	25	7	29	16	5	9	0	16	-3	-3	3	9	7	-5	18	22	24	10.9
27	-3	-5	13	-2	9	6	7	6	-5	29	12	1	5	10	1	4	3	-1	4	-3	26	4	5	9	24	5.6
28	15	3	36	29	6	-5	36	-1	-3	36	8	5	12	16	10	18	21	28	17	3	15	34	9	11	24	15.0
29	14	-3	31	13	15	18	17	20	23	19	1	7	15	13	20	24	16	23	8	26	11	10	-5	28	24	15.2
30	39	-5	19	4	32	13	0	25	-5	2	19	11	8	-3	11	8	7	0	26	0	-5	34	21	-5	24	10.7
31	26	3	25	2	18	9	6	15	13	14	6	7	10	20	25	-5	23	7	11	11	5	13	11	0	24	11.5
NO.	29	29	30	29	29	30	30	30	30	30	31	31	31	31	30	31	31	31	31	31	30	30	29	29		
MAX.	39	22	37	36	32	32	38	30	26	36	33	16	20	31	25	24	27	28	26	48	33	34	34	31		
AVG.	9	3	11	7	8	5	5	5	7	9	7	4	6	6	7	6	8	7	5	11	7	9	7	7		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Warm Springs Site February 2010 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	37	28	14	38	3	7	9	13	10	16	-5	12	2	4	9	8	22	6	15	-5	24	-4	2	3	24	11.2
2	-3	4	2	-4	-1	-5	-2	5	-4	-5	6	5	-4	-5	10	-5	0	11	1	4	14	2	5	14	24	1.9
3	-5	9	27	-5	21	3	0	10	-5	27	11	10	9	8	17	14	4	-4	9	31	14	15	15	23	24	10.8
4	20	16	-5	53	-5	19	-5	27	3	27	6	14	13	19	9	21	12	35	-5	17	2	22	-4	-2	24	12.9
5	15	9	-4	3	12	-3	14	5	4	-1	6	3	2	1	-2	6	3	-5	12	13	15	7	14	12	24	5.9
6	14	35	2	19	28	26	19	13	16	22	8	0	12	1	-1	9	3	5	13	31	7	10	23	2	24	13.2
7	-5	11	13	2	-3	-5	1	18	-5	-5	9	7	1	7	7	4	16	-5	20	5	4	9	16	18	24	5.8
8	11	6	2	15	3	-1	13	12	15	4	8	2	14	5	3	15	8	5	-5	23	5	9	21	7	24	8.3
9	13	2	12	7	18	2	12	1	0	22	1	-4	7	-4	8	5	10	7	4	-3	10	7	10	2	24	6.2
10	0	7	16	-5	10	5	-2	-1	5	1	2	-5	7	0	3	-1	7	7	-1	6	-2	7	-5	3	24	2.7
11	-1	-3	4	0	0	1	3	2	-5	2	1	-2	2	8	-5	5	5	11	2	-1	7	-3	0	-4	24	1.2
12	2	1	1	-4	-2	3	4	-5	9	2	0	6	-3	2	-2	8	-5	-4	-3	0	7	-1	-5	11	24	0.9
13	-5	8	0	2	-1	-5	2	1	-4	9	4	4	-4	-2	10	-1	-1	5	-2	-5	3	6	16	5	24	1.9
14	-5	9	-5	3	4	1	2	-5	3	13	-3	3	-4	-3	2	15	-5	7	9	2	6	5	0	1	24	2.3
15	5	14	11	3	25	8	27	6	9	9	3	7	-3	13	-5	4	1	6	-5	28	-5	5	5	8	24	7.5
16	-5	9	11	-5	15	12	-5	17	18	9	12	7	3	9	4	5	13	8	-4	13	4	10	-5	7	24	6.8
17	16	-2	1	18	-4	18	-5	-3	8	6	6	-5	17	-5	16	-5	23	-4	13	0	-4	19	-5	9	24	5.3
18	-5	2	1	0	27	-5	26	-5	20	-5	5	7	1	9	3	4	5	1	2	4	-1	19	-4	7	24	4.9
19	-5	4	9	-5	16	-5	7	8	-1	-5	2	3	4	4	6	5	-4	0	7	10	14	0	-2	1	24	3.0
20	19	18	0	1	16	-5	13	8	1	8	8	0	20	-5	13	5	7	2	3	14	10	-5	-5	-3	24	6.0
21	2	11	1	-5	16	-2	12	1	17	0	5	11	16	3	1	BA	19	11	8	9	-5	14	15	23	23	8.0
22	1	7	14	-5	29	-2	8	10	-5	16	11	5	8	11	8	13	9	1	4	-3	23	-5	1	26	24	7.7
23	12	4	2	-3	34	-5	23	-5	23	-5	15	5	2	5	4	5	17	6	4	6	5	16	-5	12	24	7.4
24	5	0	11	7	5	0	10	3	7	3	4	0	8	2	5	5	-1	9	-2	4	-3	12	11	-5	24	4.2
25	-5	-2	5	4	-5	3	-2	1	2	-5	0	-3	-5	11	-3	5	15	-5	-5	-5	-1	6	-5	36	24	1.5
26	-5	0	15	-3	10	-3	-5	7	-4	4	5	1	6	2	4	5	-3	-1	8	1	2	2	0	-2	24	1.9
27	2	8	-4	1	4	7	3	3	-4	0	6	-1	9	4	5	3	5	-1	0	-5	12	5	12	3	24	3.2
28	11	-5	11	11	1	6	-1	2	6	9	3	-5	15	6	10	-1	-3	6	-2	-3	-5	4	-4	25	24	4.0
NO.	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28		
MAX.	37	35	27	53	34	26	27	27	23	27	15	14	20	19	17	21	23	35	20	31	24	22	23	36		
AVG.	5	8	6	5	10	3	6	5	5	6	5	3	6	4	5	6	7	4	4	7	6	7	4	9		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Warm Springs Site March 2010 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-5	7	9	1	-3	-5	2	9	5	-5	1	-2	3	3	1	1	6	1	6	-5	10	-5	31	8	24	3.1
2	1	5	2	4	-3	0	-1	0	2	-1	1	2	5	2	-1	2	2	-4	5	0	7	6	5	6	24	2.0
3	-1	5	-5	9	9	5	18	-5	29	-3	3	6	3	5	0	1	0	5	-5	5	-5	8	11	13	24	4.6
4	-5	11	5	-2	3	-3	20	-5	11	-1	4	7	5	4	9	-2	9	15	-5	0	5	14	-5	4	24	4.1
5	9	10	-5	-4	27	-5	18	3	24	6	-4	0	11	4	2	2	9	0	-1	-3	-5	1	16	5	24	5.0
6	22	5	-4	5	-5	3	5	1	15	-1	5	8	11	2	1	6	8	0	-1	5	-5	25	9	36	24	6.5
7	-5	-5	24	11	-5	17	-5	13	3	7	3	-5	10	10	7	3	-1	-1	8	-5	-3	1	19	11	24	4.7
8	10	8	-4	9	5	11	-2	4	13	-1	9	1	5	9	1	6	7	4	0	-2	9	-5	22	24	24	6.0
9	-5	1	2	-2	-2	-5	6	2	13	10	-1	17	4	3	15	-5	12	13	-5	2	11	-5	1	-3	24	3.3
10	4	3	0	7	-5	5	6	-5	10	17	6	-2	1	8	3	12	6	5	6	2	-5	5	5	17	24	4.6
11	-5	17	12	-5	10	-5	-5	12	2	3	-1	5	4	-3	3	5	0	5	-4	0	-5	9	4	7	24	2.7
12	2	3	3	8	-4	4	-1	6	-5	5	3	7	2	6	-5	6	-2	1	6	4	-1	4	6	3	24	2.5
13	4	2	9	-1	3	8	1	4	1	8	-3	-5	5	-3	0	1	-4	-4	5	3	-3	3	2	0	24	1.5
14	3	-2	8	-1	-5	-5	0	10	-5	0	13	2	1	4	3	7	0	-1	-4	-2	-5	30	-5	15	24	2.5
15	4	7	-1	24	-5	-1	19	-2	8	14	11	9	10	8	9	3	7	2	-1	-5	-5	10	-3	26	24	6.2
16	-2	-2	11	7	8	-5	6	-5	5	9	7	7	6	0	3	-5	7	0	-5	-5	12	-5	4	6	24	2.7
17	8	0	-5	7	2	-5	13	0	20	19	35	22	18	27	52	47	34	6	4	-4	10	1	-2	17	24	13.6
18	4	2	2	6	8	9	2	-5	23	4	6	9	8	10	6	12	2	20	7	20	9	26	13	0	24	8.5
19	-1	2	-5	22	-5	8	-3	-4	-1	-2	11	-2	5	2	-1	3	0	5	-5	-1	-5	20	8	21	24	3.0
20	-5	12	-5	-2	5	-5	11	-3	-3	-3	6	-1	2	1	10	1	3	2	-5	0	-4	3	1	11	24	1.3
21	9	3	7	3	0	5	-2	4	7	2	12	15	9	12	11	7	4	10	1	-1	3	11	11	10	24	6.4
22	36	9	3	3	4	-2	-5	3	-5	18	11	6	2	-1	10	-2	0	3	2	-2	-2	2	12	11	24	4.8
23	3	-5	2	2	9	15	-5	24	-5	10	9	-1	-1	15	3	5	8	5	6	1	0	6	-5	19	24	5.0
24	1	9	1	5	10	-3	11	-5	6	16	10	5	11	16	16	9	12	16	18	6	12	10	16	19	24	9.5
25	21	17	-3	9	-2	9	5	1	11	8	3	3	15	15	14	3	21	-5	21	-5	4	11	4	-5	24	7.3
26	15	-5	16	-1	-5	11	2	-5	0	2	7	6	6	-3	-4	-5	11	0	3	-4	0	-2	3	7	24	2.3
27	0	-5	2	2	2	1	3	0	2	-4	8	10	7	3	3	-2	3	-5	6	4	-3	6	-5	25	24	2.6
28	1	2	0	3	1	-5	0	-5	7	3	5	BA	51	5	10	8	12	2	5	4	5	4	33	6	23	6.8
29	-4	7	5	10	12	8	10	7	4	5	11	1	-2	9	-3	14	-4	-5	4	-5	-1	10	-2	-2	24	3.7
30	-5	4	9	-1	-2	-5	1	-5	5	1	-4	10	-5	1	4	-2	1	-5	3	-4	-5	14	15	16	24	1.7
31	-5	0	-3	15	-5	-3	11	-5	6	4	-3	2	0	-5	11	-5	6	-5	-5	-1	11	-3	7	7	24	1.3
NO.	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31		
MAX.	36	17	24	24	27	17	20	24	29	19	35	22	51	27	52	47	34	20	21	20	12	30	33	36		
AVG.	4	4	3	5	2	2	5	1	7	5	6	5	7	5	6	4	6	3	2	0	1	7	7	11		

Note: Negative values and method detection limits will be addressed in the 2010 Annual Report.

Qualifier Codes and Descriptions

as of 12-APR-07

Qualifier Type	Qualifier Type Desc	Qualifier Code	Qualifier Desc
EX	Exceptional Event Qualifier	D	SANDBLASTING
		F	STRUCTURAL FIRE
		H	CHEMICAL SPILLS & INDUST. ACCIDENTS
		I	UNUSUAL TRAFFIC CONGESTION
		J	CONSTRUCTION/DEMOLITION
		K	AGRICULTURAL TILLING
		L	HIGHWAY CONSTRUCTION
		M	REROUTING OF TRAFFIC
		N	SANDING/SALTING OF STREETS
		O	INFREQUENT LARGE GATHERINGS
		P	ROOFING OPERATIONS
		Q	PRESCRIBED BURNING
		R	CLEAN UP AFTER A MAJOR DISASTER
NAT	Natural Event Qualifier	A	HIGH WINDS
		B	STRATOSPHERIC OZONE INTRUSION
		C	VOLCANIC ERUPTIONS
		E	FOREST FIRE
		G	HIGH POLLEN COUNT
		S	SEISMIC ACTIVITY
		U	SAHARA DUST
NULL	Null Data Qualifier	AA	SAMPLE PRESSURE OUT OF LIMITS
		AB	TECHNICIAN UNAVAILABLE
		AC	CONSTRUCTION/REPAIRS IN AREA
		AD	SHELTER STORM DAMAGE
		AE	SHELTER TEMPERATURE OUTSIDE LIMITS
		AF	SCHEDULED BUT NOT COLLECTED
		AG	SAMPLE TIME OUT OF LIMITS
		AH	SAMPLE FLOW RATE OUT OF LIMITS
		AI	INSUFFICIENT DATA (CANNOT CALCULATE)
		AJ	FILTER DAMAGE
		AK	FILTER LEAK
		AL	VOIDED BY OPERATOR
		AM	MISCELLANEOUS VOID
		AN	MACHINE MALFUNCTION
		AO	BAD WEATHER
		AP	VANDALISM
		AQ	COLLECTION ERROR
		AR	LAB ERROR
		AS	POOR QUALITY ASSURANCE RESULTS
		AT	CALIBRATION
		AU	MONITORING WAIVED
		AV	POWER FAILURE (POWR)
		AW	WILDLIFE DAMAGE
		AX	PRECISION CHECK (PREC)
		AY	Q C CONTROL POINTS (ZERO/SPAN)
		AZ	Q C AUDIT (AUDT)

		BA	MAINTENANCE/ROUTINE REPAIRS
		BB	UNABLE TO REACH SITE
		BC	MULTI-POINT CALIBRATION
		BD	AUTO CALIBRATION
		BE	BUILDING/SITE REPAIR
		BF	PRECISION/ZERO/SPAN
		BG	Missing ozone data not likely to exceed level of standard
		BH	Interference/co-elution
		BI	Lost or damaged in transit
		BJ	Operator Error
		BK	Site computer/data logger down
		SA	Storm Approaching
QA	Quality Assurance Qualifier	1	Deviation from a CFR/Critical Criteria Requirement
		2	Operational Deviation
		3	Field Issue
		4	Lab Issue
		5	Outlier
		6	QAPP Issue
		7	Below Lowest Calibration Level
		9	Negative value detected - zero reported
		MD	Value between MDL and IDL
		ND	No Value Detected
		SQ	Values Between SQL and MDL
		V	VALIDATED VALUE
		W	FLOW RATE AVERAGE OUT OF SPEC.
		X	FILTER TEMPERATURE DIFFERENCE OUT OF SPEC.
		Y	ELAPSED SAMPLE TIME OUT OF SPEC.

ATTACHMENT 1

LABORATORY ANALYTICAL REPORTS

Note: Non-applicable portions of laboratory reports have been excluded.

Monday, May 03, 2010

Analytical Laboratory

Steve Heck
Kuipers & Associates, LLC
P.O. Box 641
Butte, MT 59703

RE: DUSTFALL BUCKETS Work Order: 1003162

Dear Steve Heck:

MSE Lab Services received 8 sample(s) on 3/29/2010 for the analyses presented in the following report.

Please find enclosed analytical results for the sample(s) received at the MSE Laboratory.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Marcee Cameron

Marcee Cameron
Laboratory Director/ Chemist
406-494-7371

Enclosure

E-MAILED
5/5 MC

MSE Lab Services

Date: *03-May-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1003162
Project: DUSTFALL BUCKETS
Lab ID: 1003162-001

Client Sample ID: KA-SP-4-49268
Collection Date: 3/28/2010 3:45:00 PM
Matrix: SOLID

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **SW**
Arsenic	18.9	0.302	1.04		mg/Kg	1	4/22/2010
Cadmium	0.967	0.018	0.069		mg/Kg	1	4/22/2010
Copper	98.3	0.285	0.868		mg/Kg	1	4/22/2010
Lead	28.3	0.031	0.139		mg/Kg	1	4/22/2010
Zinc	208	0.634	2.08		mg/Kg	1	4/22/2010
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS			**MISC**				Analyst: **BO**
Sample/Filter Weight	0.0720	0.0001	0.0001		g	1	4/19/2010

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE-TA Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

MSE Lab Services

Date: *03-May-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1003162
Project: DUSTFALL BUCKETS
Lab ID: 1003162-002

Client Sample ID: KA-SP-4-49440
Collection Date: 3/28/2010 12:45:00 PM
Matrix: SOLID

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **SW**
Arsenic	25.8	0.245	0.844		mg/Kg	1	4/22/2010
Cadmium	1.41	0.015	0.056		mg/Kg	1	4/22/2010
Copper	127	0.231	0.703		mg/Kg	1	4/22/2010
Lead	59.4	0.025	0.112		mg/Kg	1	4/22/2010
Zinc	240	0.514	1.69		mg/Kg	1	4/22/2010
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS			**MISC**				Analyst: **BO**
Sample/Filter Weight	0.0889	0.0001	0.0001		g	1	4/19/2010

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *03-May-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1003162
Project: DUSTFALL BUCKETS
Lab ID: 1003162-003

Client Sample ID: KA-SP-4-49516
Collection Date: 3/28/2010 1:00:00 PM
Matrix: SOLID

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **SW**
Arsenic	ND	0.528	1.82		mg/Kg	1	4/22/2010
Cadmium	ND	0.032	0.121		mg/Kg	1	4/22/2010
Copper	0.799	0.498	1.52	J	mg/Kg	1	4/22/2010
Lead	0.159	0.055	0.243	J	mg/Kg	1	4/22/2010
Zinc	20.0	1.11	3.64		mg/Kg	1	4/22/2010
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS			**MISC**				Analyst: **BO**
Sample/Filter Weight	0.0412	0.0001	0.0001		g	1	4/19/2010

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *03-May-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1003162
Project: DUSTFALL BUCKETS
Lab ID: 1003162-004

Client Sample ID: KA-DF-10-001
Collection Date: 3/28/2010 1:15:00 PM
Matrix: SOLID

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL			**SW6020A**	**E200.2**			Analyst: **SW**
Arsenic	1.68	0.033	0.114		µg/L	1	4/22/2010
Cadmium	0.150	0.002	0.008		µg/L	1	4/22/2010
Copper	4.93	0.031	0.095		µg/L	1	4/22/2010
Lead	2.53	0.003	0.015		µg/L	1	4/22/2010
Zinc	17.1	0.069	0.228		µg/L	1	4/22/2010
TOTAL DISSOLVED SOLIDS			**A2540C**				Analyst: **YF**
TDS	19	5	10		mg/L	1	4/1/2010

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *03-May-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1003162
Project: DUSTFALL BUCKETS
Lab ID: 1003162-005

Client Sample ID: KA-DF-10-002
Collection Date: 3/28/2010 4:00:00 PM
Matrix: SOLID

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL			**SW6020A**	**E200.2**			Analyst: **SW**
Arsenic	1.04	0.036	0.125		µg/L	1	4/22/2010
Cadmium	0.056	0.002	0.008		µg/L	1	4/22/2010
Copper	4.61	0.034	0.104		µg/L	1	4/22/2010
Lead	1.36	0.004	0.017		µg/L	1	4/22/2010
Zinc	20.3	0.076	0.250		µg/L	1	4/22/2010
TOTAL DISSOLVED SOLIDS			**A2540C**				Analyst: **YF**
TDS	17	5	10		mg/L	1	4/1/2010

Review

Qualifiers:				
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *03-May-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1003162
Project: DUSTFALL BUCKETS
Lab ID: 1003162-006

Client Sample ID: KA-DF-10-003
Collection Date: 3/28/2010 4:05:00 PM
Matrix: SOLID

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL			**SW6020A**	**E200.2**			Analyst: **SW**
Arsenic	1.86	0.022	0.076		µg/L	1	4/22/2010
Cadmium	0.037	0.001	0.005		µg/L	1	4/22/2010
Copper	5.41	0.021	0.063		µg/L	1	4/22/2010
Lead	6.83	0.002	0.010		µg/L	1	4/22/2010
Zinc	13.1	0.046	0.152		µg/L	1	4/22/2010
TOTAL DISSOLVED SOLIDS			**A2540C**				Analyst: **YF**
TDS	10	5	10		mg/L	1	4/1/2010

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE-TA Analytical Laboratory
P.O. Box 4078
200 Technology Way
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Fax: 406-494-7230
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MSE Lab Services

Date: *03-May-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1003162
Project: DUSTFALL BUCKETS
Lab ID: 1003162-007

Client Sample ID: KA-DF-10-004
Collection Date: 3/28/2010 4:30:00 PM
Matrix: SOLID

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL			**SW6020A**	**E200.2**			Analyst: **SW**
Arsenic	0.075	0.024	0.083	J	µg/L	1	4/22/2010
Cadmium	0.145	0.001	0.006		µg/L	1	4/22/2010
Copper	0.393	0.023	0.069		µg/L	1	4/22/2010
Lead	0.075	0.003	0.011		µg/L	1	4/22/2010
Zinc	1.88	0.051	0.167		µg/L	1	4/22/2010
TOTAL DISSOLVED SOLIDS			**A2540C**				Analyst: **YF**
TDS	ND	5	10		mg/L	1	4/1/2010

Review

Qualifiers:	E	Value above quantitation range		H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit		Limit	Instrument Reporting Limit
	MDL	Method Detection Limit		ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *03-May-10*

CLIENT: Kuipers & Associates, LLC
Lab Order: 1003162
Project: DUSTFALL BUCKETS
Lab ID: 1003162-008

Client Sample ID: WT CHEM TDS BLANK
Collection Date: 4/1/2010
Matrix: AQUEOUS

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL			**SW6020A**	**E200.2**			Analyst: **SW**
Arsenic	0.033	0.022	0.075	J	µg/L	1	4/22/2010
Cadmium	ND	0.001	0.005		µg/L	1	4/22/2010
Copper	0.100	0.021	0.062		µg/L	1	4/22/2010
Lead	0.016	0.002	0.010		µg/L	1	4/22/2010
Zinc	0.250	0.046	0.150		µg/L	1	4/22/2010
TOTAL DISSOLVED SOLIDS			**A2540C**				Analyst: **YF**
TDS	ND	5	10		mg/L	1	4/1/2010

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

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Date: 03-May-10
Report Date: 03-May-10

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Work Order: 1003162
Project: DUSTFALL BUCKETS
BatchID: 3199

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
*Sample ID: **3199-PB-UNFILTERED***			*Method: **SW6020***		*Batch ID: **3199***			*Analysis Date: **4/22/2010***		
Arsenic	ND	0.150	mg/Kg							
Cadmium	ND	0.010	mg/Kg							
Copper	ND	0.125	mg/Kg							
Lead	ND	0.020	mg/Kg							
Zinc	ND	0.300	mg/Kg							
*Sample ID: **3199-PB-FILTERED***			*Method: **SW6020***		*Batch ID: **3199***			*Analysis Date: **4/22/2010***		
Arsenic	ND	0.150	mg/Kg							
Cadmium	ND	0.010	mg/Kg							
Copper	ND	0.125	mg/Kg							
Lead	ND	0.020	mg/Kg							
Zinc	0.247	0.300	mg/Kg							
*Sample ID: **3199-LCS***			*Method: **SW6020***		*Batch ID: **3199***			*Analysis Date: **4/22/2010***		
Arsenic	66.0	0.147	mg/Kg	69.01	95.7	80	120			
Cadmium	213	0.010	mg/Kg	210.2	102	80	120			
Copper	176	0.122	mg/Kg	174.0	101	80	120			
Lead	80.7	0.020	mg/Kg	82.99	97.3	80	120			
Zinc	574	0.293	mg/Kg	641.3	89.5	80	120			
*Sample ID: **1003162-001AMS***			*Method: **SW6020***		*Batch ID: **3199***			*Analysis Date: **4/22/2010***		
Arsenic	31.8	1.04	mg/Kg	13.89	92.9	75	125			
Cadmium	18.0	0.069	mg/Kg	17.36	97.9	75	125			
Copper	183	0.868	mg/Kg	86.80	97.2	75	125			
Lead	34.0	0.139	mg/Kg	6.944	81.7	75	125			NA
Zinc	375	2.08	mg/Kg	173.6	95.6	75	125			
*Sample ID: **1003162-001AMSD***			*Method: **SW6020***		*Batch ID: **3199***			*Analysis Date: **4/22/2010***		
Arsenic	31.7	1.04	mg/Kg	13.89	92.5	75	125	0.155	20	
Cadmium	18.0	0.069	mg/Kg	17.36	98.2	75	125	0.270	20	
Copper	183	0.868	mg/Kg	86.80	97.2	75	125	0.0172	20	
Lead	33.8	0.139	mg/Kg	6.944	79.4	75	125	0.478	20	NA
Zinc	372	2.08	mg/Kg	173.6	94.2	75	125	0.686	20	

Review

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Lab: 406-494-7334
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Date: 03-May-10
Report Date: 03-May-10

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 1003162
BatchID: 3200

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
*Sample ID: **3200-PB-UNFILTERED***			*Method: **SW6020A***		*Batch ID: **3200***			*Analysis Date: **4/22/2010***		
Arsenic	ND	1.50	µg/L							
Cadmium	ND	0.250	µg/L							
Copper	ND	1.25	µg/L							
Lead	0.088	0.250	µg/L							
Zinc	ND	5.00	µg/L							
*Sample ID: **3200-PB-FILTERED***			*Method: **SW6020A***		*Batch ID: **3200***			*Analysis Date: **4/22/2010***		
Arsenic	ND	1.50	µg/L							
Cadmium	ND	0.250	µg/L							
Copper	ND	1.25	µg/L							
Lead	ND	0.250	µg/L							
Zinc	ND	5.00	µg/L							
*Sample ID: **3200-LCS***			*Method: **SW6020A***		*Batch ID: **3200***			*Analysis Date: **4/22/2010***		
Arsenic	18.4	1.50	µg/L	20.00	92.2	80	120			
Cadmium	2.00	0.250	µg/L	2.000	99.9	80	120			
Copper	20.8	1.25	µg/L	20.00	104	80	120			
Lead	20.4	0.250	µg/L	20.00	102	80	120			
Zinc	331	5.00	µg/L	400.0	82.8	80	120			
*Sample ID: **1003162-004AMS***			*Method: **SW6020A***		*Batch ID: **3200***			*Analysis Date: **4/22/2010***		
Arsenic	3.17	0.114	µg/L	1.520	98.2	70	130			
Cadmium	2.15	0.019	µg/L	1.900	105	70	130			
Copper	14.5	0.095	µg/L	9.500	101	70	130			
Lead	3.19	0.019	µg/L	0.7600	86.8	70	130			
Zinc	36.6	0.380	µg/L	19.00	102	70	130			
*Sample ID: **1003162-004AMSD***			*Method: **SW6020A***		*Batch ID: **3200***			*Analysis Date: **4/22/2010***		
Arsenic	3.16	0.114	µg/L	1.520	97.7	70	130	0.226	20	
Cadmium	2.23	0.019	µg/L	1.900	109	70	130	3.60	20	
Copper	14.9	0.095	µg/L	9.500	105	70	130	2.75	20	
Lead	3.21	0.019	µg/L	0.7600	90.6	70	130	0.900	20	
Zinc	37.0	0.380	µg/L	19.00	104	70	130	1.11	20	

Review

Qualifiers: NA Sample conc. Is > 4*spike level S Spike Recovery outside accepted recovery limits

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 03-May-10
Report Date: 03-May-10

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 1003162
BatchID: R12380

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***PB (1003162-008A)***			*Method:* ***A2540C***		*Batch ID:* ***R12380***				*Analysis Date:* ***4/1/2010***	
TDS	ND	10	mg/L							
Sample ID: ***LCS***			*Method:* ***A2540C***		*Batch ID:* ***R12380***				*Analysis Date:* ***4/1/2010***	
TDS	780	10	mg/L	757.5	103	80	120			

Review

Qualifiers:
NA Sample conc. is > 4*spike level
S Spike Recovery outside accepted recovery limits

FORM MSE-169
(Rev. 09/08)

MSE Technology Applications, Inc.
Laboratory Services

CHAIN OF CUSTODY

MSE WORK ORDER # 1003162

* Bill to Kuipers + Associates

Company Name: Blacktail Consulting.	Project Manager:
Address: PO Box 4697	Project Name and Number:
City: Butte State: MT Zip: 59702	Email Address: sheckerfwave.net
Phone: 498-4199	Purchase Order #:
Fax:	Sampler Name and Phone #: Steve Heck

ANALYSIS REQUESTED: As, Cd, Cu, Pb, Zn (Total Particulate)

REMARKS

Turnaround Time (TAT) / Reporting

- X Standard
- ___ Next Day*
- ___ 2nd Day*
- ___ Other*

*All rush order requests must have prior approval

- ___ Phone
- ___ Mail
- ___ Fax
- X Email

SAMPLE ID	LAB ID	DATE	TIME	As, Cd, Cu, Pb, Zn	Total Particulate
KA-SP-4-49268	1003162-001A	3-28-10	1545	X	X
KA-SP-4-49440	002A	3-28-10	1245	X	X
KA-SP-4-49516	003A	3-28-10	1300	X	X
KA-DF-10-001	004A	3-28-10	1315	X	X
KA-DF-10-002	005A	3-28-10	1600	X	X
KA-DF-10-003	006A	3-28-10	1605	X	X
KA-DF-10-004	007A	3-28-10	1630	X	X

Please contact Steve Heck when ready to weigh filters
498-4199

Inspection Checklist

Received Intact?	(Y)	N
Labels & Chains Agree?	(Y)	N
Containers Sealed?	(Y)	N
Cooler Sealed?	Y	(N)

Delivery Method: by hands in box, no ice
Temperature (°C): 15°C
Preservative: ___
Date & Time: ___
Inspected By: ___

RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
Steven R Heck	3-29-10	1435	Yan Fang	3/29/10	2:35 pm
PRINTED NAME: Steven R. Heck	COMPANY: Blacktail Cons		PRINTED NAME: YAN FANG	COMPANY: MSE	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	

MSE LABORATORY SERVICES
200 Technology Way, P.O. Box 4078
Butte, MT 59701
PH: (406) 494-7334 / FAX: (406) 494-7128
labinfo@mse-ta.com

MSE Lab Services

Sample Receipt Checklist

Client Name KUIPERS&ASSOC Date and Time Received: 3/29/2010 2:35:00 PM

Work Order Number 1003162 RcptNo: 1 Received by YF

COC_ID: CoolerID:

Checklist completed by Dubbiee Ortega 3-31-10 (Signature / Date) Reviewed by DW 4/1/10 (Initials / Date)

Matrix: Carrier name Hand-Delivered

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☒ DW	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☑	No ☐	Not Present ☐
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Water - VOA vials have zero headspace?	No VOA vials submitted ☑	Yes ☐	No ☐
Water - pH acceptable upon receipt?	Yes ☒	No ☐	Blank ☐

Adjusted? no Checked by YF 4/1/10

Any No and/or NA (not applicable) response must be detailed in the comments section be

Client contacted _____ Date contacted: _____ Person contacted _____

Contacted by: _____ Regarding: _____

Comments: TEMP=N/A(SOLID)

Corrective Action _____

PAGE 1 OF 1 LIMS # 12380 QA CHECK ✓ S

CLIENT Kuipers & Assco

ANALYSIS ~~TDS~~ TDS KW ANALYST YF DATE 4/1/10 Balance: Mettler

LAB ID # 1003162 REVIEW KW DATE 4/2/10 Ohaus

	SAMPLE ID	BEAKER NUMBER	INITIAL BEAKER WEIGHT (g)	SAMPLE VOLUME (mL)	WEIGHT 1 (g)	WEIGHT 2 (g)	WEIGHT 3 (g)	WEIGHT 4 (g)	TDS (mg/L)
1	4A	K6	117.4876	658	117.4994	117.5061	117.5004	117.5003	19.3009
2	5A	K7	114.2510	600	114.2606	114.2634	114.2610	114.2614	17.3333 ~~101~~ → ~~17~~ YF
3	6A	K5	114.7766	990	114.7859	114.7904	114.7862	114.7866	10.1010 ~~100~~ → YF
4	7A	K3	116.5120	900	116.5130	116.5160	116.5138	116.5140	2.2222 ~~20~~ → YF
5	PB	K8	116.5685	100	116.5684	116.5689	116.5687	116.5689 YF	4
6	LCS	K4	119.1185	100	119.1962	119.1973	119.1966	119.1965	780
7									RSA = 102.97%
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									

Total solids LCS = WC2284 → ~~765~~ 757.5 mg/L → ~~RSA = 101.96~~ % YF

YF

NON-CLP METALS PREPARATION

BATCH: 9464	WO#: 100436	CLIENT: Kleinfelder & Assoc.	
PREP DATE: 5-5-10	PREPPED BY: YF/BO	REVIEW DATE: 5/5/10	REVW'D BY: MC

INSTRUMENTATION:	PROTOCOL:	MATRIX:	ANALYSIS:
ICP-AES	DRNKNG H2O	WATER	TOTAL
~~ICP-MS~~	~~SW-846~~	SOIL	DISSOLVED
GFAAS		COMPOST	DIRECT
		EXTRACT	
		OTHER Filters	

DATE SAMPLED: 4-26-10

DIGEST TEMP: 89°C

METHOD: 3050 B MS "As Received" 100% Dry

REAGENTS				
	VOL. HNO_3 (mL):	5ml conc	LAB #:	3458
	VOL. H_2O_2 (mL):	5ml 30%	LAB #:	3402
	VOL. HCl (mL):	NA	LAB #:	NA

#	LAB ID	pH <2	SAMPLE WT (g)	SAMPLE VOL (mL)	FINAL VOL (mL)	QA/QC	COMMENT
1	100 4136-001A		0.0637	NA	50		Blue tops Top filter
2	002A		~~0.00.1267~~				1
3	3245-LCS		0.5039			QC 5612	—
4	3245-PB-Unfiltered						
5	3245-PB-filtered			NA	50		
6							
7							
8	MS @cust						
9	MSD @cust						
10							
11							
12			Top filter LIMS # 12574 (filter wt)				
13							
14							
15							
16	Middle filter not prepped						
17							
18	001A		0.0465				
19	002A		0.0421				
20							
21							
22							
23							
24							

ADDITIONAL COMMENTS:

LIMS# 3245